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THE DEPARTMENT OF PUBLIC INSTRUCTION

Studies in Educational Measurements in Wisconsin

Bulletin No. 1

A Report On

The Use of Some Standard Tests

For 1916-17

By

W. W. THEISEN

Supervisor of Educational Measurements

Issued by

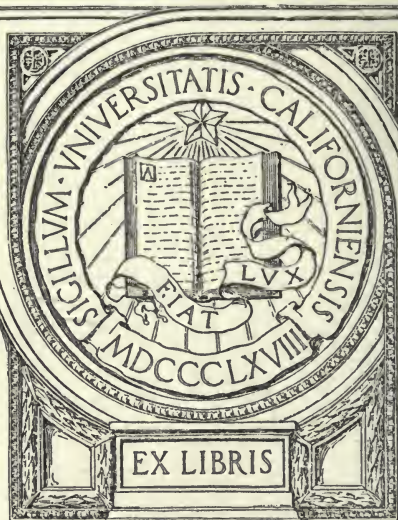
C. P. CARY

State Superintendent

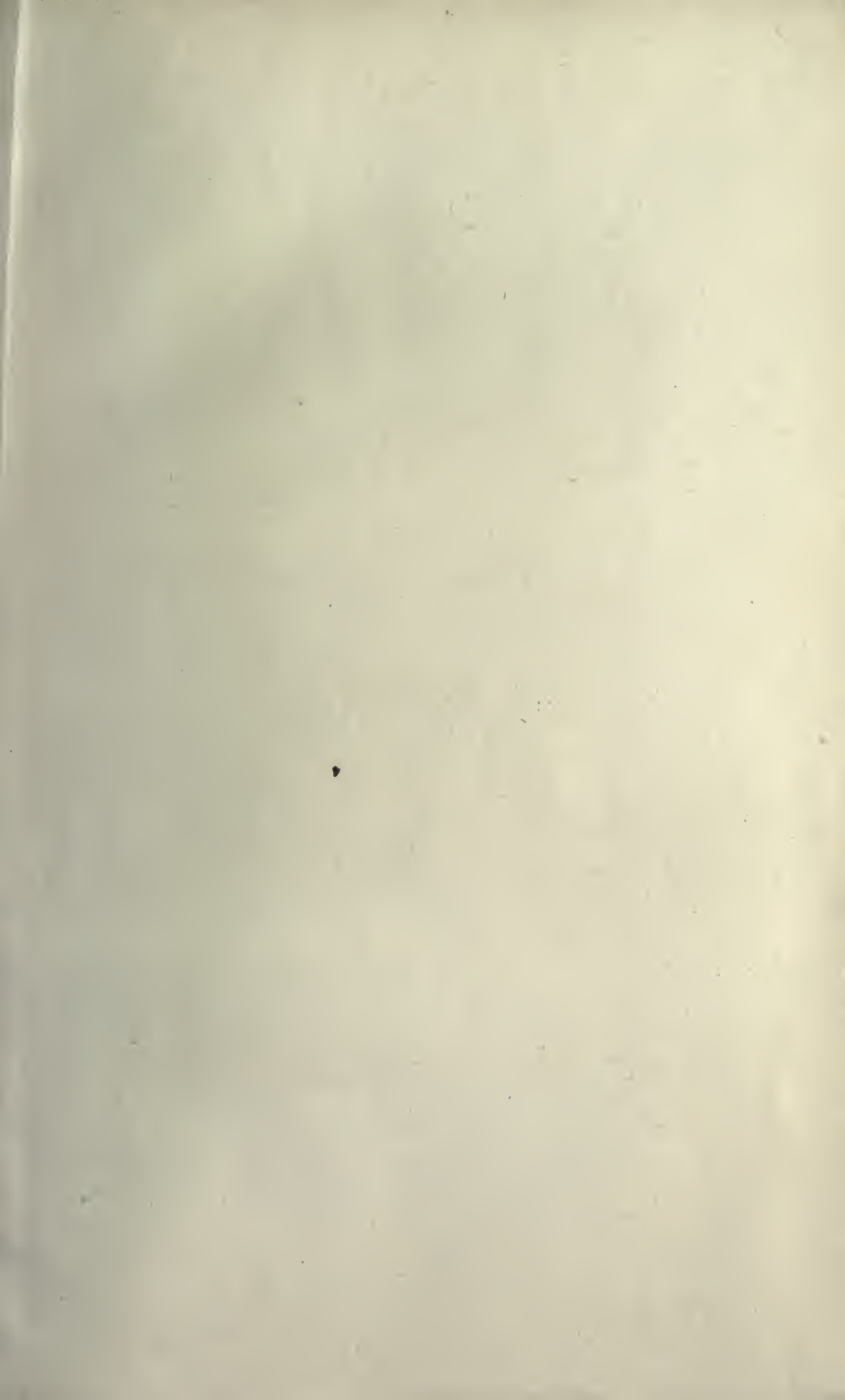
MADISON, WISCONSIN

1918

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A REPORT ON THE USE OF SOME STANDARD TESTS FOR 1916-17

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INTRODUCTION

The following pages aim to present some of the findings arrived at through the application of standard tests and scales to the measurement of results in school subjects in Wisconsin for the school year 1916-17. It is in no way to be considered as a final report on the subjects included. Its conclusions must be regarded as tentative only.

The work in standard tests and measurements instituted by the state department of education during the past year has as its primary aim the improvement of instruction. Its purpose is to discover, first, in objective terms, the degree of success achieved in the teaching of school subjects, and second, to point out possible means of improvement.

To measure the achievement of pupils on a state-wide scale is an undertaking requiring no mean amount of labor. It is of course physically impossible for any one person to conduct standard tests in any large proportion of the schools of the state even in a few subjects. This has made it necessary to depend in no small measure upon the cooperation of others. Were all or even a large proportion of the teachers, principals, supervisors, and superintendents in the state trained in the supervision of instruction through standard tests and scales, it would be a relatively simple matter to ascertain the achievement of the children of the state in a number of subjects. In the absence of any such favorable conditions, no small portion of the time of the supervisor in charge of educational measurements has of necessity been devoted to the training of teachers, principals, supervisors, and superintendents in the field. To reach larger numbers in less time, this type of activity has been confined in the main to cities employing large numbers of teachers. The tentative Wisconsin standards of achievement in a number of subjects given in the pages following are consequently made up of figures representing pupils' scores in cities, except for the tests in spelling and handwriting, which were given in a large

number of rural and graded schools as well, through the cooperation and assistance of those in charge of these schools.

The standards proposed in this report are to be regarded as tentative only. As teachers and superintendents become better trained in the application of tests and scales, and as more and more schools are included in the returns, the reliability of the results obtained will be increased. The present proposed standards will have served a useful purpose if they tend to increase the accuracy with which pupils' products are judged, if they assist teachers in determining to a larger extent the degree of their teaching success, and if they suggest possible directions for improvement.

For those who are not fully acquainted with the needs and possibilities of standard tests and scales in bringing about improvements it may be well to indicate briefly some of the ways in which they are being employed. In the first place, the measurement of school products through the application of standard tests and scales represents an effort to measure success objectively in terms of the results achieved by the children. This removes two serious limitations to the older method of measuring results by examination.—The two limitations of the older method are these: (1) teachers' judgments differ so materially as to what should be expected of a given grade of pupils that a fourth or a fifth grade standard of work does not mean the same thing in two schools; (2) teachers differ in their judgment of the worth of children's products. Standard measurements are being utilized to fix more definitely the degree of achievement or standard to be reached in successive grades and to increase the reliability with which children's products are judged.

The measurement of achievements in school subjects affords a means of discovering certain facts directly related to the supervisory and administrative program, and of evaluating the teaching methods employed. It is to the teacher that standard tests and scales are most helpful when properly used. This is a fact as yet realized by few teachers. Progressive teachers and supervisors are making use of them to measure the attainments of classes in terms of some definite standard, as for example, to discover whether certain sixth grade pupils exceed or fall short of the standard of 25 on the Woody subtraction test. They employ them to discover the range and variation of the perform-

ances of the individuals in a class, the seriousness of the overlapping of performances from grade to grade, the progress from year to year or over some other given interval.

The possibilities of standard tests as diagnosing instruments are just beginning to dawn upon many teachers and supervisors. They are being employed by some to aid in diagnosing class, group, and individual teaching needs, as for example, to find out how seriously progress in arithmetic is being affected by such matters as lack of facility in borrowing, pointing off, multiplication or division of cipher quantities, inverting fractional divisors, or failure to estimate answers; or how progress in history or geography is affected by inability to comprehend the thought of what is read; or how success in spelling is hindered by failure to acquire the habit of analyzing words for their difficult parts; or how inability to write a good composition is to be traced to failure to exercise the imagination, to think coherently, or to faulty mechanics. Standard tests and scales thus become a means of measuring the success of the methods of teaching used. They stimulate teachers to a more careful study of aims, methods, results, and class and individual teaching needs. Supervisors find them especially serviceable as time savers, enabling them to make more accurate observations of certain phases of the teaching in much less time than when each classroom must be visited one or more times. They apply standard tests to measure the success of different methods, of method *versus* no method, and of different courses of study. The results of the tests and the factors involved furnish a basis for discussion between teacher and supervisor, or between the teacher and the pupil or the parent. They enable the supervisor to compare one school with another, or the school system with other school systems.

From an administrative point of view, standard tests and scales are being used to establish a more equitable basis for promotion, to determine the desirability of promoting or transferring individual pupils, or of promoting them in certain subjects. This is frequently done in spelling, where under an arrangement of parallel programs, each pupil takes spelling in whatever grade most nearly fits his ability to profit by the spelling teaching. Again, standard tests are used to locate unclassified pupils. The results furnish a basis in some schools for

sectioning pupils for purposes of instruction into slow, average, and rapid advancement sections, or of placing them in special classes. Some schools in Wisconsin and elsewhere are beginning to employ standard tests for purposes of preliminary diagnosis of pupils suspected of mental incapacity, or for selecting pupils to be recommended for more complete mental testing. Standard tests are being used by others to determine the advisability of certain eliminations, additions, or changes in the course of study or in textbooks, either for the school as a whole or for certain groups of pupils. Many schools, for example, are finding it advisable as a result of test scores to omit many words previously included in spelling lists, to place the major emphasis upon words commonly used but misspelled, and to provide a more intelligent arrangement of review exercises in spelling and arithmetic. In some schools the test results furnish a basis for determining the time to be allotted to a given subject. Unusually proficient classes or individuals may be excused for a time from regular spelling or writing periods, or again it may be found that certain classes or individuals could profitably give more time to thought reading. Others discover that it is advisable to restrict the time given to subjects yielding but a small return on the time investment.

One other significant application of standard tests is that made by the superintendent in reporting upon the success of the schools to the board of education or to the community. The results furnish tangible evidence of the successful achievements or shortcomings of the schools, and afford a basis for discussion with the boards as to the need of additional expenditures for textbooks, supplies, and teachers' or supervisors' salaries. Some superintendents are still unnecessarily timid about applying standard tests lest it may appear that their schools are not up to standard or at least not up to the point of efficiency that the public has been led to believe. That this is a false attitude for a superintendent to take, thoughtful school people will readily agree. If the schools really are superior, standard measures and tests will reveal the fact. If they are deficient at any point the condition, when recognized by the superintendent, can be remedied.

In the preparation of the report contained in the pages following the writer is indebted to the many superintendents, prin-

cipals and teachers of the schools cooperating in giving the tests. He is especially grateful to Miss Elizabeth A. Ahern, statistical assistant, who made many of the tabulations and computations; to Dr. B. R. Buckingham of the State Board of Education for many valuable criticisms and suggestions; and to Mrs. Cecile White Flemming of the State Department of Education for a critical reading of the manuscript.

CHAPTER I

SPELLING

Opportunity was given to each county, to a number of state graded schools, high schools,¹ and cities to participate in a test in spelling. The purpose of the test was (1) to throw light on the spelling proficiency of Wisconsin children, and the probable causes of weakness; and (2) to stimulate interest in, and efforts toward improvement in teaching, through the scientific study of results. The test selected from the Ayres list of 1000 common words was uniform in all schools. In rural and state graded schools and in the case of several high schools, the test was sent out from the office of the state superintendent and was given under the immediate direction of the principals, supervisors or superintendents of these schools. The test in most city schools and in a number of high schools was given during the fall of 1916 under the immediate direction of the supervisor of educational measurements. In rural and state graded schools the test was given near the close of the first semester.

The following letter was sent to each county superintendent.

Office of the State Superintendent

Madison, Wis., Dec. 19, 1916.

We will appreciate it very much if you will cooperate with us to the extent of giving the accompanying spelling test in your schools. If you do not give it in all schools please arrange to have it given in the first fifteen schools; taking alphabetically the surnames of the teachers in your county.

We enclose directions for giving the test and scoring the results, a

¹ Graded schools having two or more departments and not organized as free high school districts are commonly organized under the law as "state graded schools." Those of two departments are known as second-class graded schools and those of three or more as first-class. This organization is common in villages. The term "high school" as used here refers to the elementary grades in schools of cities and towns organized as district free high schools. For the most part they include cities of 1500-3000 population.

copy of which is to be sent to this office. The test is to be given without previous study. In order to make results comparable it should be given before January 13.

We are enclosing also a questionnaire calling for certain data on the course of instruction in spelling in your schools.

Yours very truly,

Supervisor of Educational Measurements.

The questionnaire sought to discover certain facts as to the course of study and organization of the work in spelling and the relation of these facts to the results obtained in the test.

Questions to be Answered With Respect to The Course of Study in Spelling

	II	III	IV	V	VI	VII	VIII
1. How many minutes per week are devoted to spelling							
2. What is the relative proportion of time devoted to oral and written spelling							
3. How many new words are taught per week.....							
4. What is the source of the words used. (Check V)							
a. Spelling text.....							
b. Reading text							
c. Other sources.....							
.....							
5. What proportion of words is derived from each of the above sources							
a. Spelling text.....							
b. Reading text.....							
c. Other sources.....							
.....							
.....							

THE TEST

The words selected for the test were arranged in three groups of twenty-five words each. The words for grades III and IV were selected from the L list of Ayres scale, those for grades V and VI from the Q list and those for grades VII and VIII from the U list.

Ayres Spelling Words

Grades

3 & 4

catch¹
warm
clothing
able
suit
watch
fell
buy
walk
soap
small
summer
express
lesson
father
table
talk
right
road
next
four
power
because
country
another

5 & 6

sometimes
engage
terrible
period
employ
select
firm
convict
command
crowd
publish
term
relative
entire
measure
serve
remember
effort
due
running
position
ledge
primary
Saturday
information

7 & 8

meant
earliest
distinguish
consideration
assure
probably
foreign
responsible
beginning
difficulty
finally
develop
issue
material
mere
senate
respectfully
agreement
unfortunate
majority
elaborate
citizen
necessary
divide
receive

These words are selected from lists that have been standardized. According to Ayres each word in any one list presents approximately equal difficulty for children of a given grade. The averages which children in Wisconsin may be expected to reach on any given list are those attained by 70,000 children in 84 cities throughout the United States. The average per cent expected in each grade when the pupils have completed just half of the work of the grade is as follows:

Grades	III	IV	V	VI	VII	VIII
Av. %	----73	88	73	84	73	84

¹Through an error in typing this word was given as *cash* instead of "catch." It is not probable that this has made the test more difficult.

Instructions for giving the test

The following uniform instructions were given to all schools.

Paper—See that all children are provided with paper of uniform size, preferably of large tablet size.

Giving the test. 1. Have each pupil write his name, age, grade, school, whether boy or girl, and teacher's name at top of sheet.

2. Pronounce each word distinctly, but do not syllabicate, or give phonetic sounds. Use each word in a sentence immediately after you have pronounced the word.

3. Scoring papers—Mark all misspelled words. All words written over thus—æ—are to be counted wrong.¹ Mark the number correct in the upper right hand corner of each paper. Place the names of the children alphabetically on a sheet by grades, and enter opposite each name the number of words correctly spelled. Place the papers in a bundle with this sheet on top. Forward the papers to the superintendent's office as soon as possible.

THE RETURNS

Returns were received from thirty-nine counties aggregating 1173 one room rural schools, from 132 state graded schools, and from 35 high and city school districts. Returns were received from a few additional counties and state graded schools which could not be used owing to the fact that the scores for each grade were not entered separately. A few reported averages only. These were likewise of necessity omitted in making up the combined scores for the state. While it was suggested to county superintendents that fifteen schools (i. e. one room rural schools) would be a sufficient number it was gratifying to note that some gave the test in every school in the county. In a number of cases the results within the county were made the subject for discussion at institutes held during the year. This attitude upon the part of superintendents and principals can hardly fail to result in an improvement in spelling in many parts of the state.

The returns which were recorded in usable form represent in the aggregate 36,564 children distributed as follows:

Rural -----	15,825
State graded -----	7,465
High and city -----	13,111

¹ Possibly a more satisfactory instruction would have been to mark all illegible answers wrong. This was discovered after the test had been given in a few schools, but it was deemed best to preserve uniformity in the directions to all schools.

THE RESULTS

The results are not particularly encouraging, a fact which may be judged from the average scores for each class of schools shown in Table I. They are in fact an indictment of the teaching of spelling in Wisconsin. The average scores attained in each class of schools, the combined score for all classes of schools and Ayres expected average may be seen in Table I. The average score for each grade and Ayres standard are represented in graphic form in Figure I.

TABLE I.—*The Average Per cent of Words Correct in Each Class of Schools*

	III	IV	V	VI	VII	VIII	Number children tested
35 cities and high schools	52	74	55	72	61	73	13,111
132 graded schools.....	64	80	59	74	67	78	7,465
39 counties..... (1173 rural schools)	64	79	60	71	63	73	15,825
Combined average.....	59	78	58	72	63	74	36,401
Ayres standard.....	73	88	73	84	73	84	

Note: It should be recalled that in most of the cities the test was given during the fall months of the first semester. All but 8 of the 35 cities are conducted on an annual promotion basis. From these facts it is estimated that the children in rural and state graded schools had completed on the average nearly one month more of the year's work than children in cities. Rural and state graded schools should be expected therefore to attain an average score approximately 2% higher in grades three and four and 1% higher in the remaining grades.

When compared with Ayres' averages attained by children in 84 American cities Wisconsin schools appear to be from one-half year to a full year behind. Children in cities do not appear to have spelled as well as children in rural and state graded schools. In tests of this sort some errors in scoring are apt to be made. It is assumed, however, that as many papers will be marked too low as too high. In that event the average is neither raised nor lowered. Unusual care was taken in some of the cities to insure accuracy in scoring. City scores may therefore be considered as somewhat more accurate than for other classes of schools. There is little reason to believe, however, that the figures for rural and state graded schools represent greater leniency in marking.

A question may be raised as to whether the scores made by our children are a reliable measure of their spelling ability. Undoubtedly more reliable results could be obtained by testing several times. While it was not possible to do this estimates can be made. By employing a method commonly used in statistics one may compute from the data of Table 2 the chances of making higher or lower scores on repeated tests.¹ By this meth-

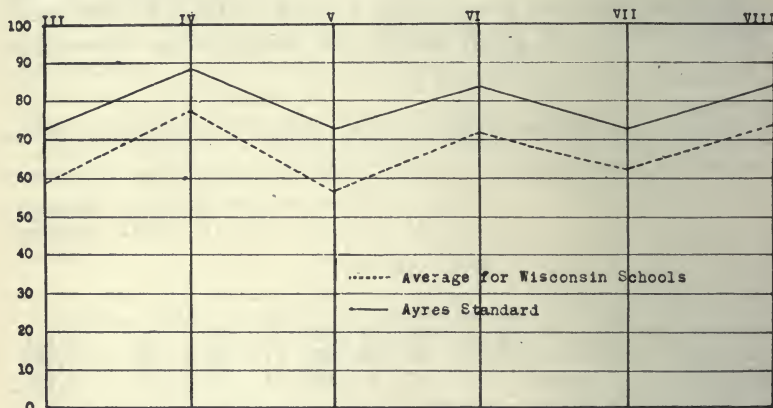


Fig 1 Average Spelling Scores in Each Grade for All Schools Combined Compared with Ayres Standard

od the writer estimates that the chances are even that a truly representative score in the third grade would not be above 61.6% or below 56.8% i. e. 2.4% higher or lower. The chances are more than four to one that it would lie between 64% and 54.4% i. e. not more than 4.8% higher or lower than the present score of 59.2%. The chances are more than twenty to one that it would lie between 66.3% and 52.1% i. e. not more than 7.2% higher or lower. The chances are even that the true score will differ less than $2\frac{1}{2}\%$ from the present score in any grade. From these facts it appears that no matter how liberal we may care to be Wisconsin children cannot be said to be good spellers.

Why children in Wisconsin appear to be poorer spellers than

¹The method based on the theory of normal distribution is that of computing the standard deviation, dividing it by the square root of the number of children and multiplying by .6745. The formula used is P. E.

$$(\text{probable error}) = .6745 \frac{\text{S. D.}}{\sqrt{n}}$$

The standard deviation (S. D.) is the square root of the sum of the squares of the differences between each individual score and the average. The S. D.'s in terms of number of words spelled by grades are: III, 7.13; IV, 5.55; V, 6.76; VI, 5.95; VII, 6.55; VIII, 5.33. The corresponding P. E.'s are: .59, .45, .57, .51, .62 and .50 respectively. To convert these figures to terms of per cent multiply by four in each case. Thus, $.59 \times 4 = 2.36$ or roughly 2.4 used in the computation above.

children elsewhere is rather difficult to discover. We in Wisconsin are certainly not willing to entertain even a remote idea that Wisconsin children are naturally inferior to children elsewhere in ability to spell. We are even reluctant to admit that spelling is not as well taught in Wisconsin as elsewhere. In the face of the facts, however, it is difficult to escape the latter conviction. It is evident that two things will be necessary (1) a careful scrutiny of the course of study in use, (2) an examination of the methods of teaching employed.

One other factor that should be considered is the reliability of the standards established by Ayres. The words used in Ayres' list of 1,000 common words were originally given as tests in sets of 20 words in two consecutive grades in a large number of cities. Following this first test Ayres rearranged the words in sets of 20 and gave each set in four consecutive grades. The fact that all of the words used were not carefully tested in every grade made it necessary to estimate what children in some grades would do in spelling certain words. This may have resulted in setting standards that are too high in some cases. Ayres claims, however, that they are approximately correct if as many as 10 words are used as a test.¹ Further evidence in support of the standards was obtained in the course of the Cleveland survey, and in Baltimore and New York City. Using words that should be spelled by 73% of the children who have completed one-half of the grade, no grade in Cleveland was found to be more than 3% below or above.² Briggs and Bamberger tested among others 5,950 sixth grade children in New York City and Baltimore.³ The words used included all of those given to Wisconsin children in the fifth and sixth grades. By recording the per cent correct for each individual word it is possible to determine from their report the average for the 25 selected words of our test. The writer has computed the average for these words from their data and finds that the 5,950 children made an average of 89.5%. These children were tested during the second half year of the grade and would be expected to reach a grade of approximately 88 or 89%. If these children were able to reach Ayres standard there seems to be no reason why Wisconsin children in the sixth grade should not have made a better record than 72%.

¹ Ayres: *A Measuring Scale for Ability in Spelling*, p. 34.

² Judd: *Measuring the Work of the Schools*, p. 87.

³ *School and Society* Nov. 3, 1917.

It should be noted, however, that Ayres makes the point that a test of words which should be spelled by 73% of the pupils includes words varying from those to be spelled by 69% to those to be spelled by 76% of the pupils. This is a range of 7%. 73% then signifies an average for the list. It is possible that in choosing the words for our tests a greater proportion of the more difficult words were selected. That such was the case is doubtful. The figures of Briggs and Bamberger indicate that our division between easier and more difficult words for grades five and

TABLE 2.—*Distribution of pupils' scores according to the number of words correctly spelled*

Number of words correct	Per cent of words correct	List L		List Q		List U	
		III	IV	V	VI	VII	VIII
0	0	112	17	61	16	16	6
1	4	146	20	104	23	38	8
2	8	131	26	148	47	60	25
3	12	163	46	155	46	64	24
4	16	167	44	145	60	89	41
5	20	173	57	197	77	100	37
6	24	222	68	199	78	99	47
7	28	179	65	202	90	111	70
8	32	213	86	227	110	153	68
9	36	238	96	259	128	152	74
10	40	228	145	262	145	162	75
11	44	216	116	260	148	212	128
12	48	251	145	246	161	231	142
13	52	243	160	255	193	205	143
14	56	269	162	301	198	245	180
15	60	283	188	309	261	267	228
16	64	295	232	299	287	296	219
17	68	286	267	332	329	283	291
18	72	323	326	322	348	313	290
19	76	323	355	291	362	311	339
20	80	342	464	331	443	324	393
21	84	332	534	324	476	340	467
22	88	369	666	292	513	330	492
23	92	413	771	326	533	270	526
24	96	354	926	293	538	239	496
25	100	357	936	235	605	159	387
Total...	.....	6,628	6,918	6,375	6,215	5,069	5,196
Average per cent correct.....		59.2	77.5	57.6	72.1	63.	74.2
Average numb'r correct.....		14.8	19.4	14.4	18.	15.8	18.6
Median number correct.....		16.3	21.7	15.5	20.	17.1	20.4

six was approximately equal. The range, however, was found to be greater than 7% as given by Ayres. The easiest word "sometimes" was spelled correctly by 97% and "information" the most difficult one by 78%. But even though our selection in some grades may have resulted in choosing a greater number of words of more than average difficulty it can scarcely account for differences as great as those between the averages attained by Wisconsin children and the standards set by Ayres.

That not all children are poor spellers may be seen from Table 2 giving the distribution of scores according to the number of words correctly spelled. There are a number of children in each grade who exceeded the expected average for that grade. They include children who are by nature endowed with greater spelling ability, children who are better graded, and children who have been better taught.

Since there were 25 words on the test, each word is equivalent to 4 per cent. Hence children in grades three, five and seven who spelled more than 18 words exceeded the average of 73% set for these grades. Those who had 22 or more words correct in grade four equalled or exceeded the standard of 88% for that grade. Similarly children in grades six and eight who had 21 or more words correct equalled or exceeded the standard of 84% for these grades. These children may be said to have spelled better than average children in American cities who have completed one-half of the work of their respective grades. There are 14,887 of the 36,401 children, or slightly less than 41%, who spelled as well or better than Ayres average for American cities. These were distributed for each class of school by grades as follows (Table 3):

TABLE 3.—*Number and per cent of Children who Spelled as well or better than Ayres expected Mid-year Average*

	III		IV		V		VI		VII		VIII		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Rural	1,204	43	1,527	50	982	37	1,102	42	844	39	1,166	45	6,825	43
State Graded ..	602	43	730	53	454	33	607	48	473	47	536	53	3,402	46
High and City.....	684	28	1,042	41	656	29	956	41	656	35	666	41	4,660	35
Total.....	2,490	38	3,299	48	2,092	33	2,665	43	1,973	39	2,368	46	14,887	41

The proportion in cities is naturally lower because of the fact that the tests in cities were given somewhat earlier in the school year.

There were pupils in each grade who failed on all of the words and others who spelled only a very few of the twenty-five words correctly. Still all were classified by their teachers and principals as pupils having third, fourth, fifth, sixth, seventh or eighth grade spelling ability. Obviously the term "fifth" or "sixth grade spelling ability" has little significance. Children in grade eight who spelled less than fourteen correctly i. e. an average of 56% are to be considered as possessing not more than sixth grade spelling ability. Similarly children in other grades making very low scores are to be considered as possessing the spelling ability of average children several grades lower than that in which they are now found. Some teachers either have been negligent in their spelling requirements for promotion, or know little of what constitutes fourth grade, or fifth grade, ability in spelling. Others apparently have accomplished little in the way of teaching children how to spell common words.

The results in each class of schools will be considered briefly.
The results in rural schools

The following table gives the average scores obtained in each county together with the combined result for all rural schools and the expected average. The highest and lowest scores for each grade are indicated in bold face. The rural school average for each county was obtained from the combined distribution of the scores for all rural schools reported from the county.

TABLE 4.—Average Ayres Spelling Scores in Rural Schools—By Counties

Counties	Number of schools tested	List L		List Q		List U		Number of children tested
		III	IV	V	VI	VII	VIII	
1.....	15	81	90	67	83	71	79	105
2.....	27	78	83	68	76	82	81	245
3.....	59	65	80	61	79	69	80	650
4.....	14	58	78	43	74	56	64	194
5.....	15	53	70	37	68	56	71	203
6.....	13	61	73	57	72	79	70	134
7.....	16	48	78	49	61	52	63	218
8.....	15	65	79	62	70	74	89	168
9.....	60	55	87	58	67	59	81	1,398
10.....	65	61	79	54	70	65	74	834
11.....	11	61	71	64	62	48	55	166
12.....	31	63	78	63	78	55	73	369
13.....	8	46	70	44	68	46	73	118
14.....	125	70	77	65	70	65	70	1,352
15.....	14	50	65	44	59	61	68	220
16.....	8	61	80	57	54	62	71	93
17.....	80	63	76	59	74	67	78	827
18.....	8	65	90	66	83	71	86	161
19.....	15	60	77	58	74	60	76	256
20.....	63	70	83	63	75	66	77	918
21.....	16	60	79	47	80	44	79	156
22.....	11	58	82	49	53	55	77	140
23.....	14	72	85	67	82	70	78	177
24.....	39	62	74	56	68	62	71	550
25.....	15	71	82	49	68	62	70	190
26.....	15	69	74	68	72	73	78	271
27.....	17	65	70	53	61	56	66	266
28.....	69	65	77	59	66	67	73	1,021
29.....	12	82	83	78	87	81	77	155
30.....	9	65	70	56	75	65	61	83
31.....	24	69	82	61	72	57	76	284
32.....	24	72	79	66	79	67	75	240
33.....	42	56	86	60	83	59	81	322
34.....	6	68	86	61	78	71	82	146
35.....	7	33	52	50	67	52	64	113
36.....	16	69	68	58	80	55	73	189
37.....	72	59	67	57	58	58	63	649
38.....	94	67	84	63	74	64	75	2,114
39.....	11	49	78	77	74	66	65	130
Rural school average		64.	79.	60.	71.	63.	73.	15,825
Ayres standard.....		73	88	73	84	73	84	.....

Judged by Ayres standards rural children in Wisconsin do not spell well. They average not less than ten points below the standard in every grade. However, when compared with other classes of Wisconsin schools as will be seen from Table I, they are not conspicuously poorer nor better spellers than the pupils in the cities and villages.

The fact that rural children spelled somewhat better than children in cities can be accounted for by the fact that the tests in most cities were given earlier in the year.

If we consider that each list of words was given in two grades we may compare grade three with four, five with six, and seven with eight. Each of the advanced grades shows improvement over the three earlier using the same lists of words. It is noticeable, however, that grade eight has only attained Ayres standard for grade seven and that grade six does not quite reach Ayres fifth grade standard.

The number of counties that reached Ayres standard

The number of counties equalling or exceeding and the number falling below Ayres expected for each grade are indicated in Table 5.

TABLE 5.—*Number of counties equalling or exceeding and number falling below Ayres Standard in each grade*

	III	IV	V	VI	VII	VIII
Number counties tested	39	39	39	39	39	39
Number equalling or exceeding standard	3	2	2	1	5	2
Number below standard	36	37	37	38	34	37

It will be seen that very few counties reach the expected average in any grade. Referring again to Table 4 it will be seen that only four counties, numbers 1, 2, 8, 18 and 29 reached the expected standard in more than one grade. The best showing is made by county 29 which exceeded the Ayres standard in four grades and did not fall less than seven points below in either of the other two grades. County 35 makes the very lowest scores in two grades and a poor showing in each of the other grades. Spelling is evidently better taught in some counties than in others.

Figure II represents graphically the average attainment for the 39 counties, the highest and lowest scores in each grade and Ayres standard. Were the children in each grade in every county able to spell as well as average children in the counties having the best spelling for each grade, Wisconsin rural children would be considered good spellers.

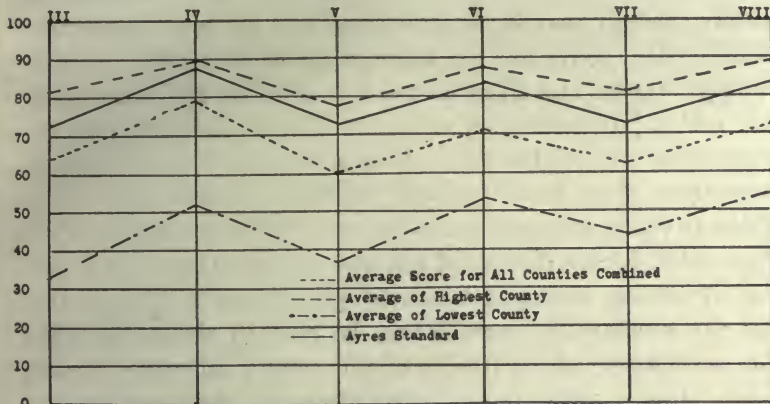


Fig. II The Average Spelling Score for 39 Counties, the Highest and Lowest Average Scores in Each Grade and Ayres Standard

The results in state graded schools¹

The returns from first and second-class state graded schools have been combined and a single average obtained. The schools almost without exception have only annual promotions and the average scores may well be compared with Ayres standard which represent scores for children who have completed just half of the work of a grade. The averages attained by combining the results from all state graded schools are given below:

TABLE 6.

Grades	III	IV	V	VI	VII	VIII
State Graded Averages.....	64	80	59	74	67	78
Ayres Standard	73	88	73	84	73	84

From Table 6 it will be seen that children in state graded schools are likewise below Ayres expected standard in every grade. The number of points below the standard varies from

¹ See first page of this section for explanation of the term "state graded schools."

six in grades seven and eight to fourteen in grade five. While the results compare favorably with those in other types of Wisconsin schools they are by no means satisfactory.

The results in high schools and cities¹

It will be recalled that the test in rural and state graded schools was given at a time when the children had spent approximately one-half year in the grade and that the standards established by Dr. Ayres are for scores made at that time. In several high schools² and cities the test was given earlier in the school year and a fair evaluation of the work must therefor take account of the date of the test. Among cities having only annual promotions, those tested during the first semester may be expected to attain averages somewhat less than the standard, while those tested during the second semester should exceed it. In the case of schools having semiannual promotions it is estimated that the standard averages should be reached about November 15th and April 1st for the first and second semesters respectively. For a test given at other times the expected average can only be estimated. To aid in making such estimates the standard averages, the average expected a full year earlier and estimated averages to be attained one-half year earlier or later are given in Table 7.

TABLE 7.—*Standard and estimated averages for successive half years³*

	List I.		List Q		List U	
	III	IV	V	VI	VII	VIII
Standard average 1 year earlier .	50	73	58	73	58	73
Estimated average $\frac{1}{2}$ year earlier	62	81	66	79	66	79
Standard average.....	73	88	73	84	73	84
Estimated average $\frac{1}{2}$ year later..	81	91	79	88	79	88

¹ Unfortunately a few cities in which the test was given are not included. In some cases the superintendent did not wish his school to be included because of the poor showing. In other instances complete returns were not received.

² The term "high school" refers to schools in cities and towns organized as district free high schools.

³ Estimated averages are computed on the basis of normal probability. See any table of probability for the amount to be added or subtracted when estimating performances at given times. Consult Ayres monograph, "Measurement of Ability in Spelling" p. 29f for the method used by Ayres in arranging his scale.

The average scores by cities arranged in approximate order of the portion of the work of the grade which pupils had completed at the time of the test are given in Table 8.

TABLE 8.—Average Ayres Spelling Scores in Cities

Wis. cities	Date Tested	Section Tested	List L		List Q		List U		Number of children tested
			III	IV	V	VI	VII	VIII	
1	9-28-16	B	39	75	47	71	51	79	248
2	10-3-16	B	39	68	46	75	63	70	529
3	10-10-16	B	28	71	54	70	65	64	386
4	10-23-16	B	29	50	30	76	72	72	195
5	10-24-16	B	42	61	57	65	51	56	470
6	10-25-16	B	69	76	55	70	65	81	211
7	10-26-16	B	51	74	55	77	62	71	351
8	10-27-16	B	41	71	54	67	64	65	179
9	11-...-16	B	42	75	55	71	61	81	2,075
10	2-5-17	A & B	61	79	49	66	61	76	1,868
11	12-5-16	B	59	79	48	74	53	65	307
12	12-8-16	B	50	78	57	70	57	63	439
13	12-13-16	B	....	....	74	80	73	84	124
14	12-14-16	B	69	....	55	77	66	71	271
15	12-15-16	B	54	60	50	74	67	81	195
16	12-...-16	B	49	67	53	70	65	71	200
17	12-...-16	B	47	73	52	79	52	73	346
18	12-...-16	B	60	88	76	87	66	74	91
19	12-...-16	B	65	93	50	65	65	88	114
20	12-15-16	B	65	64	60	85	66	82	175
21	12-28-16	B	65	78	....	....	....	....	40
22	10-18-16	A & B	47	69	59	74	41	72	384
23	3-13-17	A & B	55	80	53	76	52	....	274
24	1-10-17	B	35	63	43	73	59	80	201
25	1-11-17	B	51	67	38	67	42	62	244
26	1-11-17	B	39	79	51	66	63	....	119
27	1-11-17	B	71	77	44	82	80	53	85
28	1-11-17	B	74	84	65	80	68	89	155
29	11-...-16	A & B	64	77	74	88	74	....	427
30	3-29-17	A & B	67	82	56	75	63	71	924
31	12-5-16	A & B	53	76	64	72	77	75	765
32	12-...-16	A & B	42	63	44	44	....	....	266
33	12-20-16	A & B	52	82	64	74	60	76	253
34	4-2-17	A	75	80	61	73	54	82	116
35	4-5-17	A	62	82	72	93	71	89	84
Combined Average.....			52	74	55	72	61	73	13,111
Ayres Standard			73	88	73	84	73	84	

The highest and lowest scores in each grade are set in bold face. They are summarized in Table 9.

TABLE 9.—*The highest and lowest average scores in each grade in cities*

	III	IV	V	VI	VII	VIII
Lowest %.....	28	50	30	44	41	53
Highest %.....	75	93	76	93	80	89

The lowest third grade average was 28% or more than 20% less than these children should have scored at the middle of their second year. The highest third grade score was 75%, only two points above the mid-year standard. It was made by a school that had completed approximately three-fourths of the year's work, and which should therefore have made a score still higher. The lowest fourth grade score is just 50%, or second-grade standard. The highest is 93. One fifth grade averaged only 30%. The highest fifth grade average was 76%. In the sixth grade the highest score was 93% and the lowest 44. Grade seven varied from 41% to 80%, and grade eight from 53% to 89%.

How it is possible for one school to score only 30% in the fifth grade or how another can fail to exceed 53% in the eighth grade when another makes an average of 89%, is difficult to comprehend. Certainly the work in spelling either has not been wisely administered or has not been well taught in cities making an unusually poor showing. Such results are unjust to the child and to the community which pays for his education.

From Table 8 it will be seen that even allowing liberally for the time of giving the test few cities made a strong showing in any grade. No city exceeds Ayres standard in all grades. Three cities, Numbers 13, 18 and 29 equal or exceed it in three grades. Three others, numbers 19, 28 and 35 equal or exceed it in two grades. Four others, numbers 20, 27, 31 and 34 exceed it in one grade. The number of cities that reached or exceeded Ayres standard and the number that failed to do so for each grade is shown in Table 10.

TABLE 10.—*The number of cities equalling or exceeding Ayres Standard and the number falling below in each grade*

	III	IV	V	VI	VII	VIII
Number cities tested.....	34	33	34	34	33	30
Number cities equalling or exceeding Ayres standard.....	2	2	3	4	4	4
Number cities falling below Ayres standard	32	31	31	30	29	26

When we consider the fact that a number of cities for each grade have not reached the standard which should have been attained a year before, it can be said without gross unfairness that Wisconsin cities are lagging more than a half year behind the standard of American cities in spelling. Whether the system of annual promotions so prevalent in the state, the course of study, or the methods of teaching are the contributing causes is a matter which individual superintendents must seek to discover.

The combined Wisconsin score for each grade in cities, Ayres standard for each grade and his standard to be attained one year earlier are represented graphically in the figure following:

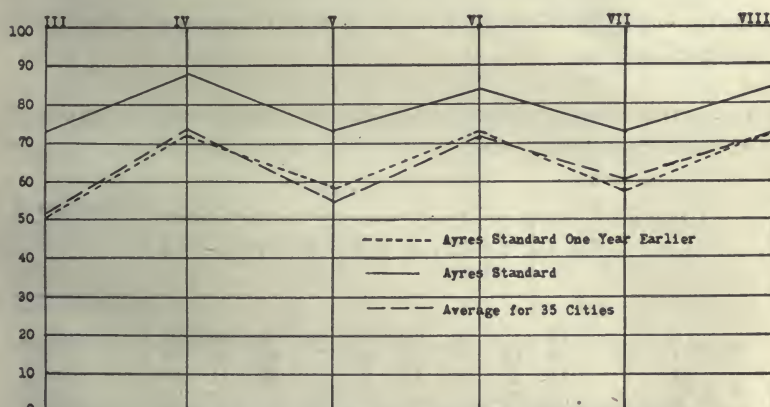


Fig. III The Average Score for 35 Cities Compared with Ayres Standard and the Standard to be Attained by the Same Children One Year Earlier

Differences in success in spelling are due to several causes. Some teachers attempt to cover too much ground. The result of this is superficial teaching. Too often the words are poorly

selected. This results in an emphasis upon words which children will have little occasion to use, and in the neglect of common words which they ought to know how to spell. Some teachers do not expect as much of their pupils as others. In some cases the teacher misjudges the spelling ability of her pupils. This appears to have been the case with many of the teachers whose pupils were tested. No teacher would knowingly be satisfied with such spelling ability as the test revealed in many schools. Teachers as a whole pay too little attention to individual differences among their children. A teacher may regard all of her pupils as of fifth grade spelling ability, when as a matter of fact some are only the equivalent of third or fourth grade spellers, and others have the ability of sixth or seventh grade pupils.

An illustration of the variation in average performances which may occur between buildings in the same city may be seen from the table below. The third grade in one building averages 19% and another 60%. One fourth grade averages 58% and another 80%. Four of the highest scores for each grade occur in one building. The figures it must be remembered are for children in the same city, where standards of grading are supposed to be equal or nearly so in all buildings. More care in grading, however, is a quite evident need in this city. It will be well for every superintendent to seek for effective means of dealing with such situations.

TABLE 11.—*Average Ayres' spelling scores in different buildings of one city*

Grades	Buildings									Average of all buildings
	1	2	3	4	5	6	7	8	9	
3	44	19	35	33	46	44	60	44	43	41
4	78	68	67	70	68	72	80	58	77	71
5	54	46	37	51	43	50	57	41	41	47
6	65	72	62	....	68	66	67	57	73	66
7	40	42	....	....	45	35	57	39	50	44
8	61	60	....	....	63	51	56	60	61	59

¹ Owing to the form in which the report was made the results for this city are not included in the preceding tables.

The variation within a grade and the overlapping of performances from one grade to the next for another city may be judged from the distribution of scores for grades three, four, five and six in Table 12. Good, average and poor spellers are found in the same grades.

TABLE 12.—*Showing variation within grades and the overlapping of performances for one city*

Number of words correctly spelled	Per cent of words correct	List L		List Q	
		III	IV	V	VI
0	0	23	.....	2	.....
1	4	27	.....	5	.....
2	8	24	3	10	.....
3	12	26	2	13	3
4	16	17	2	12	2
5	20	20	1	13	1
6	24	17	6	13	4
7	28	22	4	10	4
8	32	15	9	14	9
9	36	22	7	15	8
10	40	11	12	10	4
11	44	13	9	18	12
12	48	18	12	16	10
13	52	17	12	13	13
14	56	17	10	22	17
15	60	18	17	11	19
16	64	17	16	22	19
17	68	15	18	16	21
18	72	13	21	14	18
19	76	8	19	11	10
20	80	17	31	17	28
21	84	12	36	18	24
22	88	18	50	13	31
23	92	6	27	14	23
24	96	7	50	13	19
25	100	6	48	13	31
TotalI.....	.....	426	422	348	330
Average % correct .....	.....	42.	75.	55.	71.

Since grades three and four were given the same test these grades may be compared with each other, as may also five with six. There is a significant overlapping of one grade on another. Many third grade children exceed a large part of the fourth

grade. A similar condition exists in the fifth and sixth grades as may be seen in Table 13. A considerable proportion of the third and fifth grades exceed the averages attained by the next higher grade in each case. There are many in the fourth and sixth grades who fail to reach the average attained by the next lower grade.

TABLE 13.

% of 3rd grade who exceed 4th grade average	17.4
% " 4th " " fall below 3rd grade average	10.9
% " 5th " " exceed 6th grade average	32.5
% " 6th " " fall below 5th grade average	21.2

% of 3rd grade who exceed lowest 25% of 4th grade	28.1
% " " " " " 50% " " "	11.5
% " " " " " 75% " " "	3.4
% of 5th grade who exceed lowest 25% of 6th grade	47.6
% " " " " " 50% " " "	28.1
% " " " " " 75% " " "	12.6

More than a fourth of the third grade children exceed the lowest fourth of the fourth grade, 11.5% did better than half of the fourth grade. 3.4% did better than 75% of the fourth grade. In the fifth and sixth grades this overlapping is even more marked. Almost half of the fifth grade did better than the poorest fourth of the sixth, more than a fifth exceeded half of the sixth grade, and one-eighth did better than three-fourths of the sixth grade. More than 15% of the fifth grade children are above Ayres sixth grade standard.

Superintendents should seek effective means of dealing with such situations as those in the two cities represented by Table 11 and 12. Two administrative measures are being employed in some cities. One is to arrange the daily programs so that all spelling occurs at the same period of the day. A child studies spelling in whatever grade is most nearly his own level of ability. Another is that of housing several classes of the same grade in one building and then sectioning them according to ability. Children strong in spelling will quite frequently be found to be the same individuals who are strong in other subjects. When this is done the course of study can be more nearly made to fit the needs of each group. Children who are already able to spell many of the words which others are striving to master need not

squander time waiting for these poorer spellers. They may be assigned more advanced work or set at some other more profitable task.

THE QUESTIONNAIRE ON THE COURSE OF STUDY IN SPELLING

As stated previously schools were asked to report such facts as the time devoted to spelling, the number of new words taught per week, the sources of the words used, the proportion of words from each source and the relative proportion of time devoted to oral and written spelling. The purpose of asking for these facts was to discover what variations exist and what if any bearing these facts have upon the results obtained. In the case of rural schools, reports were submitted in many cases for each school rather than for the county as intended, thus greatly increasing the work of tabulating the returns.

THE TIME DEVOTED TO SPELLING

The median amount of time per week given to the teaching of spelling for 165 rural schools selected at random from 24 counties, 29 state graded schools, and 21 high schools and cities, as reported by principals and superintendents, is shown in the accompanying table. The median indicates in each case that one-half of the schools represented by the figures above devote more and the other half less than the figure given. The reliability of the figures is of course dependent upon the reliability of the reports submitted by teachers and superintendents. Only in some rural schools is there reason to believe that significant errors may sometimes have been made in reporting.

TABLE 14.—*Number of Minutes per Week Devoted to Spelling*

	II	III	IV	V	VI	VII	VIII
165 rural schools.....	45	50	50	50	50	50	55
State graded schools.....	50	60	75	50	67.5	75	75
High schools and cities.....	70	75	75	75	75	85	75

The figures indicate that the typical school does not spend an undue amount of time on spelling. In fact the time is small,

especially in rural schools. A reasonable amount is 75 minutes per week or 15 minutes per day including both study and teaching periods. This means roughly 5% of the total school time. Schools which give much more time than that to the subject of spelling should stop to consider whether such a policy provides for a fair apportionment of the time among all of the subjects on the daily program. Some teachers reported several hundred minutes per week given to spelling in each grade. Superintendents should not tolerate such extravagant and unwise use of time. On the other hand, satisfactory results cannot be secured when too little time is allowed. It is not likely that any but unusually capable teachers can develop good spellers in less than ten minutes per day or three fifteen minute periods per week. Until such time as we have evidence to the contrary, it will be well to allow 15 minutes per day for the intensive teaching and study of spelling. The small amount of time given in some schools seems to indicate a tendency on the part of some teachers to rely upon the incidental teaching of spelling to secure satisfactory results. This is probably one of the causes contributing to poor spelling in Wisconsin.

The Record of Two Rural Schools in One County

TABLE 15.—*The time devoted to spelling, the number of new words taught per week, and the average scores in two rural schools in one county*

School.	III			IV			V			VI			VII			VIII		
	T	W	A	T	W	A	T	W	A	T	W	A	T	W	A	T	W	A
A....	360	15	64	....	....	....	350	25	56	400	30	64	....	....	....	350	20	97
B....	30	15	70	30	15	89	65	25	91	65	25	89	75	30	60	75	30	80

T=Number minutes per week. W=Number of new words per week. A=Average score.

The need of standardizing the time devoted to spelling is strikingly portrayed in these two rural schools in one county. Both attempt to accomplish almost equal amounts of work as shown by the number of new words taught each week, yet school A at the cost of much more time, accomplished on the whole far less than school B. The teacher in school B makes much better use of the time at her disposal. She is apparently a better teacher of spelling. There can be no doubt that much time is

squandered where such extravagance is shown as in school A. This is a serious matter particularly in rural schools where the number of days attended each year and the number of years a child remains in school are, on the whole, less than in other classes of schools. When spelling is well taught, fifteen minutes per day is ample time. When poorly taught, no amount of time will secure satisfactory results.

The Time Devoted to Spelling and the Average Spelling Scores in Eight Counties

Eight county superintendents gave averages only in reporting the time given to spelling in the schools tested. In some counties, these averages are known to have been accurately computed, but it is feared that in a few the figures represent estimates. However, the average time as reported and the average score made on the test are given in Table 16 in the hope that other county superintendents may be induced to make a more careful study of the relation of time to results in spelling.

TABLE 16.—*The Average Time Devoted to Spelling and the Average Spelling Scores in Eight Counties*

Counties	III		IV		V		VI		VII		VIII	
	T	A	T	A	T	A	T	A	T	A	T	A
1.....	30	70	30	83	30	63	40	75	40	66	40	77
2.....	41	56	46	66	61	60	72	83	39	59	60	81
3.....	100	81	100	90	150	67	150	83	150	71	150	79
4.....	75	62	75	74	75	56	75	68	75	62	75	71
5.....	*	58	*	70	*	37	50	68	60	56	60	71
6.....	41	80	42	88	63	64	48	84	43	88	44	72
7.....	150	65	150	77	170	59	170	66	150	67	150	73
8.....	20	55	25	87	30	58	30	67	50	59	50	81

T—Time in minutes per week.

A—Average % of words correct.

*—Spelling taught in connection with reading.

In Table 16, counties three and seven give more time to spelling than any of the others. Do they make the best showing on the test? County three makes the best score in the third and fourth grades. In the fifth grade, its score is low but still superior to that of the other counties. On the whole, this county pays high for results which, with two exceptions, are not above the expected average. In county seven, no grade reaches Ayres

standard. This county likewise pays high for what it gets. In county five, spelling is taught in connection with reading through grade five. The unsatisfactory results in this county may be noted from the fact that it makes the poorest score in four of the six grades tested. The table indicates further that the best seventh and eighth grade scores were made in counties devoting not more than ten minutes per day to spelling.

Time and Average Scores in Ten State Graded Schools

Table 17 gives the time devoted to spelling and the average scores made in ten first-class state graded schools, (i. e. schools with three or more grade teachers.)

TABLE 17.—*The Time Devoted to Spelling and the Average Spelling Score in Each Grade for Ten First-Class State Graded Schools*

Cities	III		IV		V		VI		VII		VIII	
	T	A	T	A	T	A	T	A	T	A	T	A
1	100	72	100	94	125	61	120	73	125	60	125	78
2	50	60	30	82	30	67	75	79	75	75	75	77
3	50	74	50	96	50	50	75	92	75	66	75	75
4	50	61	25	82	25	61	25	56	50	66	50	89
5	100	76	100	97	75	47	60	65	65	73	65	63
6	100	72	100	94	100	71	100	91	100	76	100	80
7	75	68	75	75	75	52	55	80	75	74	75	84
8	75	73	75	82	75	68	75	68	75	62	75	82
9	75	57	75	90	75	55	75	80	75	79	75	80
10	75	55	50	69	50	68	50	78	75	90	75	94

T—Time in minutes per week.

A—Average % of words correct.

Here again it is evident that more time does not necessarily guarantee better results. The best scores in the three upper grades were made on a seventy-five minute per week schedule. The best scores in the third, fourth, and fifth grades were made in schools giving one hundred minutes per week. In grades three and four, however, they are only slightly superior to the averages made in schools in which spelling receives only one-half as much time.

Time and Average Scores in Ten High Schools and Cities

Table 18 shows the number of minutes weekly given to spelling and the average scores on the test for 10 selected high schools and cities.

TABLE 18.—*Number of Minutes per Week given to Spelling and the Average Scores for Ten High Schools and Cities*

Cities	II		III		IV		V		VI		VII		VIII	
	T		T	Av.	T	Av.	T	Av.	T	Av.	T	Av.	T	Av.
1	25		30	61	50	79	60	49	60	66	80	61	60	76
2	75		75	62	75	82	75	72	75	93	85	71	85	89
3	.....		75	60	75	88	50	76	50	87	50	66	50	73
4	120		120	47	100	73	175	52	200	79	140	52	125	73
5	.....		100	75	125	80	75	61	.....	73	70	54	75	82
6	30		50	65	75	64	75	60	100	85	100	65	100	82
7	65		75	69	125	76	75	54	100	70	100	65	100	81
8	150		150	51	125	67	125	38	125	67	125	41	75	62
9	75		100	54	100	60	100	50	60	74	60	67	100	81
10	.....		100	.....	115	.....	100	74	100	80	85	73	60	84

The figures give us further evidence that under present methods of teaching spelling, a larger amount of time spent upon the subject is not necessarily rewarded by better results. In grade three the two schools that made the lowest scores give the most time to the subject. In grade four the two schools attaining highest averages do so on a 15 minute daily allotment. The lowest score was made on a schedule of 20 minutes per day. The highest fifth grade score occurred in a school giving only 10 minutes per day to the subject and the lowest in one giving 25 minutes per day. The school giving the most time to spelling, 175 minutes per week or 35 minutes per day, attained an average score of only 52%. The two best scores in the sixth were made in schools giving 75 and 50 minutes respectively per week, i. e., 15 and 10 minutes per day. The school which gives 200 minutes per week attains a score only slightly above the average of the ten schools. Again in the seventh and eighth grades some of the highest scores were attained where the time allotments are relatively short and some of the lowest scores were made at a relatively high time cost.

The figures of Tables 17 and 18 seem to indicate that in these schools at least the results bear little relation to the time given

to spelling. The correlations by the Foot Rule method are insignificant.¹

THE SOURCES OF WORDS USED IN SPELLING

The replies to the question calling for the proportion of words derived from the reading text, the spelling text and other sources, indicate that the first two of these are far more popular with teachers than the third. While time has not permitted a careful summary of the answers received from all schools, there is sufficient evidence to warrant the statement that reading texts are given an undue prominence as a source of spelling material. It is not unusual in lower grades to find that all of the spelling words are selected from the reading text. In upper grades the spelling text predominates as a source. There are very few schools that do not derive at least a part of the words taught from the reader. Of 300 rural schools selected at random, only 9 do not use the reader as one source in some grade. Every one of 28 state graded schools and nearly all of the high schools and cities that answered the question, select some words from readers. The proportion ranges from "a few" to "all." The average scores made on the test and the percentage of words taken from the reading text by two state graded schools that select a high proportion from the reader in every grade are shown below. Neither one of these two schools comes near the expected spelling average in any grade.

¹Closeness of relationship is commonly computed mathematically by certain well known formulae. While a considerable number of cases should be used when computing correlations, the writer has taken the liberty to calculate correlation figures for Tables 17 and 18 by the Spearman Foot Rule method. By this method the schools are ranked in order in both factors. If each school held the same rank in both time and results the correlation would be said to be perfect. Perfect correlation is represented by unity or 1. Zero represents no correlation and -1 represents perfect negative correlation. The correlation thus obtained for Tables 17 and 18 when converted to terms of the Pearson coefficient by the formula $r = 2 \cos \frac{\pi}{3} (1-R) - 1$, are by grades:

TABLE 17	
Grade III	+ .310
" IV	+ .490
" V	- .109
" VI	+ .448
" VII	+ .109
" VIII	.0
Ave.	+ .208

TABLE 18	
—	.500
—	.338
—	.212
—	.153
—	.448
—	.0
—	.275

TABLE 19.—*Average Scores and the Per cent of Words Derived from the Reading Text in Two State Graded Schools*

School	III		IV		V		VI		VII		VIII	
	% R	Ave.	% R	Ave.	% R	Ave.	% R	Ave.	% R	Ave.	% R	Ave.
A	97	47	?	72	95	57	95	65	90	36	90	69
B	50	61	86	69	86	47	86	59	86	66	86	69

% R = per cent of words derived from reading text.

While no significant conclusions can be attached to the results attained in these two isolated schools, there is good reason to believe that the question of the source of the spelling material and the results obtained on the test are intimately related. The unusual prominence given to the reading and spelling texts in Wisconsin appears to be a cause contributing to the poor showings made on the test. The writer regrets that time has not permitted the collection of sufficient detailed evidence on this point. Many teachers do not appear to realize that the vocabulary of the language used in the reader and that used by the child in his writing and in his thinking are materially different. Readers are written by adults, and too often in the language of adults rather than of children. Much of the subject matter deals with experiences foreign to most children. Teachers must seek to discover the words which children use when writing and that they will continue to use in later years. These are the words they need to know how to spell. Efforts must be made to enlarge the vocabulary used by children, but judgment must be exercised in developing it in the right direction. Precious time should not be taken up with the teaching of many words which children will never have opportunity to spell.

Under the caption "other sources" the baneful influence of the Wisconsin State Fair list, especially in rural schools, is not infrequently noted. Geography, language, history, agriculture, arithmetic and physiology are mentioned as other sources of material. This represents an improvement, but many of the words in these sources are of a kind which the child will never be called upon to spell outside of the schoolroom. One county superintendent encourages the spelling of words which the child

encounters in the home, on the playground, and in newspapers and magazines. He reports that "Children are assigned certain work such as: 'Bring to class as many words as you can which you find used in the kitchen, at the table, etc.' " Here again caution must be exercised or unnecessary words will be included. In some cases children are encouraged to keep notebooks for recording words which they do not know how to spell. In some schools where good teaching of spelling was observed, each child was being encouraged to keep an individual list of the words which he misspells in his written work. This method of selecting the words which each child needs to know should be encouraged. Some superintendents ask each teacher to prepare a list of the words which children misspell in written work. These are assembled and form the basic spelling list. This list is then supplemented by words occurring in some of the more scientific studies of spelling, such as those of Ayres, Jones and others. Such procedure in the selection of spelling material is altogether too rare. It is to be hoped that the results of the state-wide test will bring home to teachers and superintendents the necessity for a wise and careful selection of the words which children shall be taught. Teachers and superintendents will do well to become familiar with the scientific studies of common words in order that they may know what are the words that are most commonly used and the number of them. They should make a careful study of the works of Jones, Cook and O'Shea, Ayres, Ballou, Pryor, Anderson, The Kansas City Committee on Spelling, and others of a similar nature. A bibliography of these will be found at the end of the section on spelling.

THE NUMBER OF NEW WORDS TAUGHT

Is it better to teach a few new words each day, or many? This is a question which should be faced squarely by every teacher of spelling. It is doubtful whether many teachers in Wisconsin give it serious consideration. If the best teaching results are to be had by teaching ten or more new words each day, then it is certainly poor economy to teach only one or two. On the other hand, if the best results are to be had by teaching a few words thoroughly, it is unwise to teach a large number with little concern for thoroughness. This theory is supported

when we consider the results of the test in the light of the number of words reported as taught in each class of schools. While it cannot be said that the attempt to teach too many words is the sole cause of poor results in spelling in Wisconsin, it is no doubt a contributing factor. That Wisconsin schools attempt to teach a large number of new words daily, if they report their practices correctly, may be judged from Table 20.

TABLE 20.—*Median Number New Words Taught per Day*

	II	III	IV	V	VI	VII	VIII
Rural	3	5	6	8	8	10	10
State Graded	4	6	6	8	7	10	10
High School and City	3	4	5	5-6	7-8	6-7	6-7

The table is based upon the same 165 rural schools referred to in the section dealing with the time devoted to spelling, 29 state graded schools and 18 high and city schools. Table 20 gives the median number of new words taught daily in each class of schools. These figures mean that one-half of the schools represented teach more than the number of words represented by the median, and the other half teach fewer. From grade three to grade eight the median rural school attempts to teach from 5 to 10 new words daily and the median state graded schools from 6 to 10. In high and city schools the median ranges from 4 to 7. These numbers, particularly in rural and state graded schools are high. They appear striking when we recall that one-half of the schools represented teach a still larger number of new words daily.

There are rural schools for each grade that report 20 or more new words taught, daily. The highest number reported from state graded schools ranges from 10 in the second grade to 20 in the eighth. In high schools and cities the highest number reported is 6 in the second, 10 in the third, 13 in the fourth and 20 in grades five, six, seven and eight. Some of those who report the largest numbers are probably including words children have already been taught in some earlier grade. Often, however, the

teacher has no knowledge of what words were taught in preceding grades.

Table 21 shows for the schools of Table 18 the number of new words taught daily as well as the number of minutes per day allotted to spelling and the average scores on the test.

TABLE 21.—*The Number of New Words Taught, the Number of Minutes per Day Allotted to Spelling and the Average Scores on the Test in Ten Cities*

City's	II			III			IV			V			VI			VII			VIII		
	T	W	Av.	T	W	Av.	T	W	Av.	T	W	Av.	T	W	Av.	T	W	Av.	T	W	Av.
1	5	1	....	6	2	61	10	2	79	12	3	49	12	3	66	12	4	61	12	4	76
2	15	5	....	15	8	62	15	5	82	15	5	72	15	6	93	17	8	71	17	8	89
3	....	....	....	15	8	60	15	8	88	10	8	76	10	8	87	10	8	66	10	8	73
4	24	5	....	24	5	47	20	5	73	35	6	52	40	15	79	28	8	52	25	9	73
5	....	....	....	20	4	75	25	5	80	15	5	61	....	8	73	14	6	54	15	6	82
6	6	2	....	10	4	65	15	5	64	15	6	60	20	7	85	20	7	65	20	7	82
7	13	7	....	15	8	69	25	9	76	15	8	54	20	8	70	20	9	65	20	9	81
8	30	3	....	30	3	51	25	4	67	25	5	38	25	6	67	25	6	41	15	6	62
9	15	3	....	20	5	54	20	5	60	20	8	50	12	8	74	12	8	67	20	9	81
10	....	....	....	20	10	....	23	13	....	20	23	74	20	17	80	17	?	73	12	?	84

It is clear that most of these schools attempt to teach more new words than modern theories of teaching spelling uphold. One is amazed at the variations in the conceptions which superintendents have of the number of new words that should be taught. The least variation from 4 to 9 occurs in the seventh and eighth grades. The widest variation is found in the fifth grade where one school requires the teaching of three new words daily, and another twenty. School number one teaches only a few words daily and gives but a small amount of attention to spelling. It made a rather low score on the test. Several factors may enter into this low record. In the first place we have no data on preceding years. While the words now taught are few in number, they may be poorly selected. The teaching may center too largely upon unusual words rather than upon common words which children need to know how to spell. This school might profit by a more generous time allotment and a better selection. Finally the methods of teaching employed should be investigated. In school number eight, which made a very poor record on the test, the number of new words taught is less than in most schools of the table and the time given to spelling is liberal. Poor teaching is apparently the most significant cause of poor results here.

THE TOTAL NUMBER OF WORDS TO TEACH

At the rate of two per day, approximately 2,500 words, i. e. words that are new and which present difficulties, can be presented by direct teaching during the elementary school course. Many more will, of course, be learned incidentally. At the rate of ten per day, this number would be increased by 10,000. The latter is a figure much larger than necessary to meet the demands of the child's written vocabulary. Careful studies of the writing vocabulary of children and adults indicate that the words which people use are fewer in number than we ordinarily suppose. Jones¹ found only 4532 different words used in the 75,000 themes written by 1,050 children in grades two to eight inclusive. No child used more than 2,812. Ayres,² in a study of the spelling vocabulary of 2,000 personal and business letters, found 542 common words. Cook and O'Shea³ found 5,200 different words in the family correspondence of 13 adults. Eldridge⁴ records 6,002 different words in a total of 43,989 words which occurred on two pages of each of four Sunday papers of Buffalo. This number would have been somewhat smaller had he not included as separate words every form or variation of each word that occurred. The teachers in Boston⁵ working under the direction of Mr. Ballou found 840 words that proved to be difficult for pupils to spell in their written work. These form the minimum list for the Boston schools. 2,542 additional words are used to form a supplementary list. In an extended investigation of the "words actually used and missed by pupils" in original compositions, the teachers of Kansas City, Mo.,⁶ under the direction of Mr. Melcher found 1,926 words missed three times or more. This list has recently been increased to 3,262. Anderson⁷ in a recent study at the University of Iowa analyzed

¹ Jones. *Concrete Investigation of the Material of English Spelling*. W. F. Jones. Vermillion, S. D.

² Ayres. *Spelling Vocabulary of Personal and Business Letters*.

³ Cook & O'Shea. *The Child and His Spelling*—Bobbs, Merrill Co., Indianapolis.

⁴ Eldridge. *Six Thousand Common English Words*—Niagara Falls, 1911.

⁵ Boston. *Spelling*. Dept. of Educ. Investigation & Measurement, Bul. I & IV.

⁶ Kansas City. *Preliminary Report of the Committee on Spelling, Research Bulletin*, No. 2. 1916. Also final report of the Committee on spelling, 1917. (Unpublished.)

⁷ Anderson, W. N. *The determination of spelling vocabulary based upon written correspondence*. Univ. of Iowa Doctor's Dissertation, 1917.

the written correspondence of persons over 18 years of age in six occupational groups. 3,723 letters were collected by pupils in 23 Iowa cities and villages. The letters represented 361,184 running words, but 77 different words made up one-half of the total number and 442 three-fourths of them. There were 9,223 different words in all, 3,217 of which were used only once. Mr. Anderson selected 3,105 words for his final list choosing those that occurred in three or more of the occupational groups and with a total frequency of five or more. Starch² tabulated 1,000 running words from each of 40 contributors to current magazines. He found 5,903 different words, 1,783 of which occurred three or more times. Words appearing less than three times were not placed in the final list unless they occurred in the study of either Ayres, Jones, Eldridge or Cook and O'Shea at least three times and were found by another of them at least once. His final list contains 2,626 words.

The results of all but the three last mentioned and of seven other lists have been summarized by Pryor.³ He finds only 1,309 words occurring in six or more of twelve lists. All of these studies emphasize the fact that the writing vocabularies are limited and nowhere nearly as comprehensive as the ordinary spelling text would have us believe. This makes it incumbent upon teachers to exercise caution in selecting the words to be taught as spelling. While several of the studies referred to above may be criticised on the ground that they omit some rather common words, it is probable that the needs of most children will be satisfied when they acquire a writing vocabulary of three to four thousand words. This does not mean that a child is to be taught to think entirely in terms of ideas that can be expressed by this number of words. A distinction must be made between teaching words to be spelled and teaching words for growth in vocabulary and in ideas. Many of the latter he will not need to learn to spell. He should be taught to spell those words which he is likely to use in writing.

² An unpublished study of the vocabulary of current literary writers by Daniel Starch, University of Wisconsin.

³ Pryor. A suggested minimal spelling list. Sixteenth Yearbook of the National Society for the Study of Education, Part I, Public School Publishing Company, Bloomington, Ill., 1917.

THE METHODS USED IN TEACHING SPELLING

Undoubtedly one significant cause of poor spelling is poor teaching. It is the consensus of opinion of the supervisory staff of the State Department of Education, that spelling is one of the poorest taught subjects in the curriculum. The work of hundreds of teachers is observed in the classroom each year, but comparatively few teachers are found who teach spelling well. In fact it may be said that in a large percentage of the cases, *spelling is not taught at all*. The assignment of the lesson is frequently of this type: "Take the first column of words on page eighteen." After ten minutes permitted for study, a written test is given on the list of ten words. A pupil who has ten correct receives a mark of one hundred for the day, and one who misspells three words receives a mark of seventy. Here the lesson ends. The next day the same routine procedure is repeated. This is not teaching, and no teacher should receive a salary for such gross incompetency.

Some of the more successful teachers of spelling first of all exercise wisdom in selecting the material to be taught. Second, they attempt to adapt the material used to the needs of the individual children in the class. There is little merit in requiring a pupil to spend time in studying words which he already knows how to spell. To expect him to divide his time equally between each of the words in a spelling list is sheer waste of valuable time. His time should be spent upon those which he does not know, with the greater emphasis upon the more difficult of these words. The studies of Buckingham¹ and Ayres² have indicated clearly that words which might be regarded as equally difficult do not prove to be so. Teachers should seek to discover which are the truly difficult words. These will require greater effort and more drill for successful mastery.

Tidyman in the issue of *School and Society* for June 30, 1917, gives a useful table for estimating the relative difficulty of words. In this table, reproduced in a modified form below, a word misspelled by 97% or more of the pupils in a grade is considered as having a difficulty of 10 for that grade. A word missed by

¹ Buckingham: *Spelling Ability; Its Measurement and Distribution*, Teachers College, N. Y.

² Ayres: *Measurement of Ability in Spelling*, Russell Sage Foundation, New York, 1915.

less than 5% in the third grade has a comparative difficulty of 2. Thus a word missed by nearly all in the third grade is approximately 5 times as difficult (the ratio of 10 to 2) as one that nearly all can spell. In grades four and five the ratio would be 10 to 4, i. e. $2\frac{1}{2}$ times as difficult.

TABLE 22.—*A Table for Determining the Difficulty of Spelling words*

Per cent of incorrect spellings.	Relative Difficulty					
	III	IV	V	VI	VII	VIII
100—97.....	10	10	10	10	10	10
96—89.....	9	9	9	9	9	9
88—73.....	8	8	8	8	9	9
72—51.....	7	7	7	8	8	8
50—29.....	6	6	7	7	7	7
28—13.....	5	5	6	6	6	7
12—5.....	4	4	5	5	6	6
4—1.....	2	4	4	5	5	5

Successful teachers of spelling employ good teaching methods. They spend a greater proportion of the time set aside for spelling in the actual teaching of spelling and only a small part of the time in testing, i. e. in written spelling. Some test the work of an entire week at one time. Thus four periods are given to teaching and one to testing. This not only allows more time for teaching but affords better opportunity to discover whether a pupil has really mastered a word.

Successful teachers see that impelling motives for wanting to learn how to spell are established. An appeal is made to the child's normal instincts and interests. His desire to learn how to spell may be influenced by his desire to excel in the spelling recitation or the spelling contest. It may be increased by a wholesome desire to be able to express himself more fully in his written work. He may be interested in improving his own ability to spell, particularly if he is taught to keep records which indicate the amount of his improvement over a given period of time.

Good spelling teachers are careful to associate each new word with the child's previous experience so that the word becomes

difficultly	finanlly	respectivaly	nessaceray
difficulty	finial	respeatfully	nessecery
difficully		respacile	nessecty
difficulting	respectfully	reseptfully	nesesary
difficallity	respectfully 14	receptfully	nesecery
diffacully	respectably 5	repefully	nesacesary
diffaculty	respectifuly 3	refebing	neseratory
diffualty	respectively 3		nesser
diffucaly	respectually 3	necessary	neccasary
diffulty	respectufuly 2	neccessary 14	neccisary
diffuct	respectifuly 2	nessary 10	neccecary
difficuly	respectally 2	nessesery 6	neccessary
diffcolty	respectly 2	nessecery 4	neccary
defuculty	respectibly 2	nessessary 4	nececcary
deffuculty	rspecfully 2	nessessary 4	neccesary
divaculty	rspectfully 2	nessessary 4	neccery
differculity	rspectufully	nessisary 3	neccissary
	rspectually	nessasary 3	neccessarily
finally	rspectafully	neccesary 3	neccessary
finaly 43	rspectuly	nesscary 2	neccesary
finely 11	rspecufuly	nesseccary 2	neccary
finnally 11	rspicfully	nesecary 2	
finnaly 5	rspectiful	nessessary 2	receive
finialy 4	rspectbly	nessessary 2	recieve 54
finially 2	rspectable	neccsary 2	recive 5
finial	rspectubly	nessesary	recieved 2
finily	rspectaly	nessacary	recived
finealy	rspectilly	nessicary	recivice
	rspectivelyally	nessacery	receleve

In the word *earliest* the most frequent misspelling occurs in the letters *lie*. The *ear* and *st* are much oftener correct. Incorrect pronunciation seems to account for such misspelling of *probably* as *probaly* given twenty times and *proibly* fifteen times. Of the 51 children who misspelled *responsible*, 42 did so on the letters *si*; 16 used *c* instead of *s*. The parts *respon* and *ble* were usually correct. *Beginning* illustrates the difficulty of the double consonant. 67 of the 73 pupils who spelled the word incorrectly neglected to double the *n*. In *difficulty* incorrect vowels, and neglecting to double the *f* account for the principal misspellings. In *finally* most children who erred knew the first three and the last two letters but they did not know what comes in between. They doubled the *n* or did not double the *l* or they had difficulty with the vowel *a*. One source of error on *respectfully* is in the double *l* but another is undoubtedly due to not knowing the pronunciation of the word. Substitutions of *s* for *c* or vice versa and double consonants appear to be the most frequent causes of incorrect spelling on *necessary*. The chief difficulty in *divide* is in the first vowel given as *e*. Another error comes through the silent letter. *Receive* was most often misspelled as *recieve*. Familiarity with the rule that *e* precedes *i* after *c* would help these children.

This study of incorrect spellings indicates very clearly that not the entire word but distinct parts of it cause misspellings.

Very rarely does the beginning and the end of a word offer difficulties. The difficulty may arise from double consonants, obscure or silent letters, pronunciation, vowels or consonants pronounced alike. Another cause of misspelling not illustrated by these words is that of homonyms.

In addition to the points already indicated in good teaching of spelling, it should be noted that many successful teachers do not expect to teach children all the words they will ever use. They train the pupils to use the dictionary when uncertain as to the spelling of a word. They acquaint pupils with a very few of the simplest rules.

CONCLUSIONS

1. The schools of each class represented, fail to reach the expected spelling average in any grade.

2. There is a wide range in the average scores made, indicating that results are much more satisfactory in some schools than in others.

3. There is a wide range in the spelling abilities shown by pupils nominally classed as being of the same grade. In nearly every grade there are some children who failed entirely. There are others in every grade who made perfect scores. Being in a grade apparently means little as far as spelling is concerned.

4. Among high schools and cities there are few schools that attain expected average standings in any grade, even when due allowance is made for the time of the year when the test was given. Comparatively few reach the expected average in any grade.

5. There is a wide difference in the time allotted upon the weekly program to spelling. The time most commonly allotted in each class of schools is: rural 50 minutes; state graded 75 minutes; high schools and cities, 75 minutes.

6. Schools vary widely in the number of new words which they attempt to teach per week. The median numbers in rural and state graded schools are higher than in high schools and cities. The median numbers for the various grades vary in rural schools from 5 in the third grade to 10 in the eighth, in state graded schools from 6 in the third to 10 in the eighth, and in high schools and cities from 4 in the third to 7 in the eighth.

7. The principal sources of words used are the reading text and the spelling text.

8. Among the apparent causes of poor results in spelling are:

- a. The attempt to teach a large number of new words each day rather than a few words well.
- b. The selection of words largely from the reading and spelling texts, and with little regard for pupils' need of knowing how to spell them.
- c. Improper grading of the children.
- d. Inefficient teaching of spelling, including:
 - (1) A disregard for differences in the individual needs and the ease with which *children* may be taught.
 - (2) A disregard for differences in the difficulty of the *words* taught.
 - (3) A disregard for differences in the difficulty of the different *parts* of a *word*.
 - (4) An entire absence of actual *teaching* in many cases.
 - (5) A poor command of the technique of the teaching process.
- e. Failure to teach spelling as a regular subject.

RECOMMENDATIONS

1. That the time devoted to spelling, including both study and recitation, be 15 minutes per day in all grades above the second.

2. That teachers attempt, through the direct teaching of spelling, to equip children with a vocabulary of 3,000 to 4,000 common words. Not more than four new words should be taught daily.

3. That in selecting the words to be taught, the more scientific studies of spelling vocabulary be freely consulted.

4. That the reading text be rarely used as a source of words to be taught for spelling, and that only such spelling textbooks be used as are based upon scientific inquiry as to the words which children need to learn how to spell.

5. That teachers require each pupil to keep an individual list of the common words which he misspells in written work, and that this means be used to discover the individual needs of each child.

6. That the results of studies in the relative difficulty of words be freely consulted in order to determine more fully the relative teaching efforts to be devoted to different words.

7. That wherever feasible, pupils be grouped for the purpose of spelling with others of somewhere near their own ability, irrespective of the normal grade in which they may belong.

8. That in the teaching of spelling, modern methods of presentation be used.

- a. First of all, care should be exercised to develop impelling motives within the pupils for wanting to know how to spell, e. g. those produced by such factors as interest in improvement, rivalry, and the desire to express one's self more fully.
- b. Second, each new word should be carefully associated with the child's own experience so that he may understand its uses.
- c. Third, each of the known avenues of approach should be utilized. Appeals should be made through the eye, the ear, the vocal cords, and the hand.
- d. Fourth, pupils should be taught the habit of analyzing a word for its difficult parts and to concentrate upon the particular syllables, or letter combinations, which make the word difficult.

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CHAPTER II

ARITHMETIC

Arithmetic is a "tool" subject. For that reason if for no other it should be taught in the most economical manner possible. It is not uncommon for schools to devote as much as one-sixth of the entire school time of the elementary grades to the subject of arithmetic. The wisdom of such a profuse time allotment is questioned by school men and women. Their questions are mainly three: (1) "Is it necessary that the course of study include as much arithmetic as it now does?" (2) "Is this generous time allotment rewarded by a corresponding success in arithmetical achievements of the children?", and (3) "Is so much time required to attain such success?" The first of these questions has been propounded for some years and is resulting in the elimination of some subject matter regarded as nonpractical. Careful students predict a much greater elimination than has yet taken place. How far this can be carried is yet to be determined by experimentation. The standard tests given in Wisconsin schools in 1916-17 have among other things attempted to answer in part the second of these questions. The data gathered in answer to question two serves to throw some light on question three.

In measuring success in arithmetical achievement certain standardized tests have gained rather wide usage. For measuring the work in fundamental operations at least two series of tests are in common use. These are the Courtis and the Woody tests. For measuring success in reasoning problems a number of tests have been devised, the best known being the Stone test. The Courtis tests consist of a series of relatively simple examples in the four fundamental operations of addition, subtraction, multiplication and division. With these tests successful achievement is measured by the speed with which the examples are

solved. The number of Wisconsin schools reporting their results on the Courtis tests in 1916-17 was not sufficient to warrant us in discussing the results at this time.

The Woody tests in the fundamentals consist of a series of four tests, one for each of the fundamental operations. The examples in these tests are so selected as to include a variety of types from very simple to relatively difficult examples. Achievement on the Woody tests may be measured by the difficulty of the examples which a given class can solve, or by the number of examples solved. The latter gives a fairly accurate indication of the difficulty of the examples which the class can solve. The nature of these tests may be judged more fully from the reproduction of the test in multiplication which follows.

Multiplication

(1) $3 \times 7 =$	(2) $5 \times 1 =$	(3) $2 \times 3 =$	(4) $4 \times 8 =$	(5) $\begin{array}{r} 23 \\ 3 \\ \hline \end{array}$	(6) $\begin{array}{r} 310 \\ 4 \\ \hline \end{array}$	(7) $7 \times 9 =$	
(8) $\begin{array}{r} 50 \\ 3 \\ \hline \end{array}$	(9) $\begin{array}{r} 254 \\ 6 \\ \hline \end{array}$	(10) $\begin{array}{r} 623 \\ 7 \\ \hline \end{array}$	(11) $\begin{array}{r} 1036 \\ 8 \\ \hline \end{array}$	(12) $\begin{array}{r} 5096 \\ 6 \\ \hline \end{array}$	(13) $\begin{array}{r} 8754 \\ 8 \\ \hline \end{array}$	(14) $\begin{array}{r} 165 \\ 40 \\ \hline \end{array}$	(15) $\begin{array}{r} 235 \\ 23 \\ \hline \end{array}$
(16) $\begin{array}{r} 7898 \\ 9 \\ \hline \end{array}$	(17) $\begin{array}{r} 145 \\ 206 \\ \hline \end{array}$	(18) $\begin{array}{r} 24 \\ 234 \\ \hline \end{array}$	(19) $\begin{array}{r} -9.6 \\ 4 \\ \hline \end{array}$	(20) $\begin{array}{r} 287 \\ .05 \\ \hline \end{array}$	(21) $\begin{array}{r} 24 \\ 21 \\ \hline \end{array}$	(22) $8 \times 5\frac{1}{2} =$	
(23) $1\frac{1}{2} \times 8 =$	(24) $\begin{array}{r} 16 \\ 2\frac{1}{2} \\ \hline \end{array}$	(25) $\frac{1}{2} \times \frac{1}{4} =$	(26) $\begin{array}{r} 9742 \\ 59 \\ \hline \end{array}$	(27) $\begin{array}{r} 6.25 \\ 3.2 \\ \hline \end{array}$	(28) $\begin{array}{r} .0123 \\ 9.8 \\ \hline \end{array}$	(29) $\frac{1}{2} \times 2 =$	
(30) $\begin{array}{r} 2.49 \\ 36 \\ \hline \end{array}$	(31) $\frac{12}{25} \times \frac{15}{32} =$	(32) $\begin{array}{r} 6 \text{ dollars } 49 \\ 8 \\ \hline \end{array} \text{ cents}$	(33) $2\frac{1}{2} \times 3\frac{1}{2} =$	(34) $\frac{1}{2} \times \frac{1}{4} =$			
(35) $\begin{array}{r} 987\frac{1}{2} \\ 25 \\ \hline \end{array}$	(36) $3 \text{ ft. } 5 \text{ in.}$ $\frac{5}{5}$	(37) $2\frac{1}{2} \times 4\frac{1}{2} \times 1\frac{1}{2} =$	(38) $\begin{array}{r} .0965\frac{1}{2} \\ .084 \\ \hline \end{array}$	(39) $8 \text{ ft. } 9\frac{1}{2} \text{ in.}$ $\frac{9}{9}$			

THE ACHIEVEMENTS OF WISCONSIN CHILDREN ON THE WOODY TESTS

Fifteen cities reported their results in addition; sixteen in subtraction; fifteen in multiplication and seventeen in division. In some cities each of the four tests were given and in others only one or two. The returns represent twenty-one cities in all. The writer directed and assisted superintendents and principals in the giving of the tests in all but three of these cities. In these three cities the tests were given by principals or superintend-

ents after a conference with the writer in which the details of giving and scoring were discussed. The test sheets were corrected by the teachers who were provided with a set of answers. They were instructed to check the papers a second time. In a few cities the papers were examined by a second person. This should have been done in all. However, in a number of schools a casual examination of papers to detect inaccuracies in scoring seemed to indicate that errors of this sort approximately balanced each other, i. e., as many were scored too low as too high.¹ It is possible that in some schools the rating of papers by teachers has resulted in scores that are too high.

The distribution of the scores on the test for each fundamental operation is shown in the tables following. These tables indicate the number of children in each grade solving each of the possible numbers correctly, e. g. The distribution for the addition test reads as follows: In grade three, five pupils had none correct, seven had one correct, four had two correct, etc. In grade four two pupils had four correct, one had five correct, etc. The total number of pupils tested in each grade, the median scores and Woody's standard median scores are shown at the foot of each table.

¹ There are those who would have all papers corrected by disinterested parties but in that case much of the benefit to be derived from a test is lost to the teacher who has little opportunity to discover the peculiar weaknesses of the children in her class. The best results will be had where careful directions are given to the teacher who scores the papers for her own room, and where all papers are carefully rechecked by a single person.

TABLE 24.—Distribution of Scores in Woody Arithmetic Test Series A.
According to Number of Examples Correct

Addition							Subtraction						
No. problems correct	III	IV	V	VI	VII	VIII	No. problems correct	III	IV	V	VI	VII	VIII
0	5	.....	.....	.....	.....	.....	0	8	3	.....	.....	.....	.....
1	7	.....	.....	.....	.....	.....	1	28	10	1	1	.....	.....
2	4	.....	.....	.....	.....	.....	2	27	5	3	.....	.....	.....
3	7	.....	.....	.....	.....	.....	3	16	6	2	2	.....	.....
4	9	2	.....	.....	.....	.....	4	7	6	1	1	.....	.....
5	17	1	.....	.....	.....	.....	5	12	9	.....	.....	.....	.....
6	17	.....	.....	.....	.....	.....	6	15	8	2	2	.....	.....
7	20	1	1	.....	.....	.....	7	31	10	2	1	.....	.....
8	24	2	.....	.....	.....	.....	8	42	14	2	1	.....	.....
9	45	5	2	.....	.....	.....	9	62	18	.....	1	.....	.....
10	67	11	2	.....	.....	.....	10	99	29	8	3	1	.....
11	81	9	3	.....	.....	.....	11	134	35	6	4	1	.....
12	114	14	4	3	.....	1	12	109	50	8	7	4	.....
13	92	18	8	1	.....	1	13	149	52	19	3	1	.....
14	98	42	10	.....	.....	.....	14	110	73	20	9	1	.....
15	98	64	21	1	.....	.....	15	107	92	33	12	4	.....
16	118	88	37	4	3	2	16	90	111	36	6	.....	.....
17	96	115	35	12	.....	1	17	82	111	87	26	3	.....
18	91	134	66	10	3	.....	18	43	123	103	30	8	.....
19	93	126	79	33	5	5	19	44	156	127	57	10	.....
20	86	143	109	33	8	1	20	26	148	184	58	21	.....
21	54	170	141	44	15	8	21	22	118	154	63	22	.....
22	42	124	132	64	25	9	22	3	56	130	73	32	.....
23	20	101	126	79	18	16	23	2	37	119	97	52	.....
24	4	67	87	96	37	19	24	1	23	60	103	52	.....
25	5	39	68	83	34	30	25	.....	6	40	107	69	.....
26	1	21	73	76	44	32	26	.....	5	28	105	92	.....
27	.....	9	44	86	61	43	27	.....	1	19	90	98	.....
28	.....	9	49	84	77	51	28	.....	.....	15	98	91	.....
29	.....	11	29	101	68	45	29	.....	.....	7	99	83	.....
30	.....	1	31	93	89	66	30	.....	2	3	69	83	.....
31	.....	4	26	99	108	93	31	.....	.....	1	33	92	.....
32	.....	.....	22	76	123	126	32	.....	.....	1	38	75	.....
33	.....	.....	11	81	108	111	33	.....	.....	.....	25	60	.....
34	.....	1	5	67	102	110	34	.....	.....	1	18	43	.....
35	.....	.....	5	51	109	130	35	.....	.....	.....	5	22	.....
36	.....	.....	3	24	81	111	.....	.....	.....	.....	.....	.....	.....
37	.....	.....	1	21	38	70	.....	.....	.....	.....	.....	.....	.....
38	.....	.....	.....	6	21	35	.....	.....	.....	.....	.....	.....	.....
39	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Total	1,815	1,332	1,230	1,333	1,178	1,116	Total	1,269	1,317	1,227	1,256	1,020	933
Median ...	15.5	20.2	22.7	28.4	31.9	33.1	Median ...	13.3	18.1	20.8	25.6	28.4	30.3
Woody's Standard Median...	14.5	18.3	23.1	29.8	32.4	34.0	Woody's Standard Median...	11.2	15.7	20.4	25.0	28.5	31.1

TABLE 25.—*Distribution of Scores in Woody Arithmetic Test Series A. According to Number of Examples Correct*

Multiplication

Division

No. problems correct	III	IV	V	VI	VII	VIII	No. problems correct	III	IV	V	VI	VII	VIII
0	57	.....	.....	.....	.....	.....	0	18	11	.....	.....	.....	.....
1	86	.....	.....	.....	1	1	1	23	8	.....	.....	.....	.....
2	44	3	.....	.....	.....	.....	2	32	8	1	.....	.....	.....
3	88	5	1	.....	.....	.....	3	27	20	1	1	.....	.....
4	87	8	1	.....	.....	.....	4	29	17	3	.....	.....	.....
5	80	18	7	.....	.....	.....	5	44	21	3	.....	.....	.....
6	79	31	6	2	.....	.....	6	38	37	9	1	.....	.....
7	80	31	4	.....	.....	.....	7	45	46	10	1	.....	.....
8	64	49	5	2	2	.....	8	45	78	20	4	1	1
9	58	40	9	2	.....	.....	9	51	101	32	4	.....	.....
10	35	57	11	3	.....	.....	10	42	148	35	10	2	.....
11	50	69	11	2	.....	.....	11	31	145	40	11	1	1
12	37	83	20	2	1	1	12	22	179	74	15	5	1
13	24	70	42	4	2	1	13	14	154	82	15	3	2
14	23	97	41	11	1	1	14	9	141	78	27	6	1
15	15	93	72	13	4	1	15	3	118	94	27	11	5
16	14	100	83	11	2	.....	16	3	104	88	31	8	3
17	13	94	110	22	3	1	17	4	93	98	52	16	6
18	7	9	148	35	4	2	18	.....	84	109	51	16	7
19	8	6	129	37	4	2	19	.....	55	116	54	26	22
20	2	53	133	50	1	3	20	.....	51	134	79	37	21
21	5	32	102	58	14	5	21	.....	47	104	79	43	22
22	1	18	74	45	13	8	22	.....	46	102	105	47	30
23	.....	17	52	54	21	13	23	.....	31	104	111	75	34
24	.....	10	32	73	28	5	24	.....	23	80	122	93	41
25	.....	6	28	77	30	14	25	.....	17	61	115	93	63
26	.....	2	22	82	49	15	26	.....	3	70	128	101	72
27	.....	3	17	86	63	40	27	.....	2	38	118	113	90
28	.....	.....	8	103	72	41	28	.....	1	28	94	135	108
29	.....	1	9	83	86	58	29	.....	1	22	95	110	131
30	.....	.....	4	75	95	63	30	.....	.....	16	88	138	117
31	.....	.....	2	84	91	73	31	.....	.....	15	61	100	141
32	.....	.....	3	58	88	91	32	.....	.....	12	44	104	100
33	.....	.....	1	49	85	94	33	.....	.....	4	40	93	111
34	.....	.....	1	43	79	100	34	.....	.....	5	28	66	85
35	.....	.....	.....	22	67	89	35	.....	.....	2	14	48	69
36	.....	.....	.....	15	33	72	36	.....	.....	2	6	23	42
37	.....	.....	.....	9	25	51	.....	.....	.....	.....	.....	.....	.....
38	.....	.....	.....	7	14	42	.....	.....	.....	.....	.....	.....	.....
39	.....	.....	.....	1	6	29	.....	.....	.....	.....	.....	.....	.....
Total	907	1,154	1,188	1,220	989	919	Total	480	1,790	1,692	1,631	1,514	1,326
Median ...	6.8	15.2	19.2	27.3	30.9	33.2	Median ...	7.6	13.5	19.6	25.1	28.4	30.0
Woody's Standard Median...	4.7	11.1	18.3	26.1	30.6	32.9	Woody's Standard Median...	5.8	9.9	16.5	23.8	27.4	30.1

Variation Within Grades. Are All Children of a Grade Equally Equipped?

Were one to judge the ability of Wisconsin children in the fundamental operations by the best performers in each grade he would be forced to conclude that their work is excellent. On the other hand were he to judge by the work of those who made the poorest records he would class the work as very poor. The

difference between the best and poorest in each grade for each of the four tests is very marked. Apparently some children are much too good for the grade and others, either as a result of poor teaching, poor grading, poor attendance, or otherwise, are far below average children for their grade. The best pupils often solved several times as many examples as the poorest. In no case did they fail to solve more than twice as many on any test. When we consider only the middle 50 per cent of the group, the range is still large as may be seen from Table 26.

TABLE 26.—*Range of Scores Made by Middle 50% of Pupils in Each Grade*

	III	IV	V	VI	VII	VIII
Addition.....	12.2- 19.7	17.7- 22.4	20.4- 25.9	24.5- 31.9	28.7- 34.6	30.2- 35.5
Subtraction....	10.7- 16.0	15.0- 20.5	18.7- 22.3	22.4- 28.7	25.6- 31.4	27.5- 32.8
Multiplication.....	4.0- 10.2	11.7- 18.1	16.8- 21.6	23.1- 30.8	28.0- 33.7	30.3- 35.6
Division	4.7- 10.2	10.7- 17.1	15.4- 23.3	21.3- 28.7	24.9- 31.6	27.0- 32.8

When we consider that one-fourth of the pupils in each grade made scores still lower than the lower figures of Table 26, and that another fourth made scores above the higher figures in each case, the variation among children of the same grade in ability to perform the fundamental operations appears very striking. Yet the children in any given grade were classed by their teachers as belonging in that grade. Apparently the best judgment was not used in grading many of these children. Some of them are capable of doing more difficult work while others are attempting work that is now beyond them. The latter especially would profit from a careful study of individual needs by teachers. In such a study teachers should encourage pupils to find the peculiar processes which each has failed to master.

That many children in each grade are no better equipped in ability to perform the fundamental operations than others in grades below, or that some in each grade are far in advance of others in grades above may be seen more clearly from the section on "Overlapping" following—"Overlapping" being the technical term for this condition.

The Overlapping of Performances from Grade to Grade

"Overlapping" is serious only when it is marked. Poor grading of children on the basis of their ability to do the work of the grade is perhaps its most direct cause. This failure to grade according to abilities, or needs, is due to the failure of teachers to recognize differences among children and to certain administrative difficulties, in part real and in part fancied.

By reference to the Tables 24, and 25, showing the distribution of the scores made on each test it will be seen that there was a decided overlapping of scores for each test. Some third grade pupils did much better than the poorest eighth graders. The presence of overlapping may be seen more clearly from Table 27, showing the scores attained by various proportions of each grade.

TABLE 27.—*The Scores Attained by Various Proportions of the Pupils in Each Grade*

	III	IV	V	VI	VII	VIII
Addition						
Lower 10 percentile*.....	9.5	15.4	18.	21.8	25.1	26.6
Lower 25 percentile.....	12.2	17.7	20.4	24.5	28.7	30.2
Median	15.5	20.2	22.7	28.4	31.9	33.1
Upper 25 percentile.....	18.7	22.4	25.9	31.9	34.6	35.5
Upper 10 percentile.....	20.9	24.4	29.3	34.5	36.3	36.9
Woody's Standard.....	14.5	18.3	23.1	29.8	32.4	34.
Subtraction						
Lower 10 percentile.....	7.4	11.4	16.3	19.3	22.8	24.2
Lower 25 percentile.....	10.7	15.	18.7	22.4	25.6	27.5
Median	13.3	18.1	20.8	25.6	28.4	30.3
Upper 25 percentile.....	16.	20.5	22.9	28.7	31.4	32.8
Upper 10 percentile.....	18.3	22.	24.9	30.9	33.4	34.5
Woody's Standard.....	11.2	15.7	20.4	25.	28.5	31.7
Multiplication						
Lower 10 percentile.....	1.9	8.4	14.	19.4	24.9	27.5
Lower 25 percentile.....	4.	11.7	16.8	23.1	28.	30.3
Median	6.8	15.2	19.2	27.3	30.9	33.2
Upper 25 percentile.....	10.2	18.1	21.6	30.8	33.7	35.6
Upper 10 percentile.....	13.9	20.5	24.3	33.5	35.7	37.6
Woody's Standard.....	4.7	11.1	18.3	26.1	30.6	32.9
Division						
Lower 10 percentile.....	2.2	8.1	12.2	17.3	21.5	23.3
Lower 25 percentile.....	4.7	10.7	15.4	21.3	24.9	27.
Median	7.6	13.5	19.6	25.1	28.4	30.
Upper 25 percentile.....	10.2	17.1	23.3	28.7	31.6	32.8
Upper 10 percentile.....	12.3	20.8	26.6	31.5	33.8	34.7
Woody's Standard.....	5.8	9.9	16.5	23.8	27.4	30.1

*The term "lower 10 percentile" refers to the score which just 10 % of the group failed to reach and which 90% exceeded. The "upper 10 percentile" refers to the score which 10% exceeded and which 90 % failed to reach.

In the sixth grade the upper 10% not only surpassed the median of eighth grade children on each of the four tests but

they exceeded Woody's standard for the eighth grade on all except subtraction. We are inclined to ask whether all children in the seventh and eighth grades should not be expected to do as well as the best 10% of the sixth. If the performances of these sixth grade children represent what can be accomplished with good teaching in the sixth grade then the seventh and eighth grades appear to have done little more than mark time. Undoubtedly, much of the teaching effort during the years that have preceded has been squandered. With improved teaching methods and better adaptation of the subject matter to individual needs, at least 90% of the seventh and eighth grades ought to do as well as the best tenth of the sixth grade. In fact there should be little need for teaching the fundamentals of arithmetic in these grades, for if 10% of the sixth grade were able to reach their present standing, a much larger portion of that grade should be able to do so with good teaching. Certainly there should be no excuse for such a poor showing as was made by the lower tenth of the eighth grade. Only in multiplication did they do as well as the best tenth of the fifth grade, and only in multiplication did they score above either the sixth grade median, or above Woody's sixth grade standard.

The amount of overlapping in upper grades is on the whole greater than in lower grades. This is accounted for in part by the fact that less emphasis is placed upon the teaching of the fundamental operations in the upper grades and in part by the fact that the examples on the tests were arranged in the form of a graded series. The graded series comes about through the arrangement of the examples in order of increasing difficulty. The proportionate increase in difficulty from one example to the next for the simpler examples in the forepart of the tests is greater than in the later and more difficult parts.¹

An examination of the figures of Table 27, reveals the fact that with only two exceptions the upper 25% of each grade exceeded the performances of the lower 25% of the next higher grade on each of the four tests. The two exceptions occur in the third and fifth grades on the test in multiplication. With few exceptions the best 10% of each grade did better than the me-

¹ See Woody's Monograph: "Measurements of Some Achievements in Arithmetic," p. 17.

dian of the next higher grade and better than the poorest tenth two grades above. The only exceptions to the former were in the third grade in multiplication and division, and the fifth grade in subtraction and multiplication. The exceptions to the latter were in multiplication for the third and fifth grades. Seemingly the best 25% of the children in each grade would be better equipped to do the arithmetic work of the next higher grade than 25% of the children now in these higher grades. It is highly probable that the upper 10% of each grade are better prepared than a large proportion of the next higher.

Now it should be observed that we do not know whether the same individuals who are among the highest in one of the four fundamentals are also among the highest in the others. This is a matter which principals and teachers should investigate. The tests give indication that some of the pupils in each grade possess superior arithmetical ability. If it is found that certain pupils are superior in all of the fundamentals it would be well to find out what they can do on a test in reasoning problems. If they prove superior also in this phase of arithmetic, the probabilities are high that they are ready for promotion in arithmetic at least. Failure to maintain a high relative standing in reasoning ability may indicate that for some pupils less time should be devoted to drill in the fundamentals and more to drill in reasoning. In the case of pupils who are strong in one or more of the fundamental operations and not in the others specialized or individual drill may be highly profitable. Drill upon the particular operations in which they reveal a weakness should be given.

The Median Scores—How Well Do Wisconsin Children Perform in the Fundamental Operations?

Table 28 is arranged to show median scores for all Wisconsin children tested and Woody's standard. The medians when omitting the records of cities having only annual promotions tested late in the year, are also shown. In the latter one city is omitted for addition, two for subtraction and three each for multiplication and division.

TABLE 28.—Median Scores for all Cities and When Omitting Cities Having Annual Promotions Tested in April and May

	III	IV	V	VI	VII	VIII
Addition						
Woody's Standard Median	14.5	18.3	23.1	29.8	32.4	34.
Median for all cities <i>a</i> ¹ ...	15.5	20.2	22.7	28.4	31.9	33.1
Median for cities <i>b</i>	15.1	20.	22.5	28.2	31.8	33.
Subtraction						
Woody's Standard Median.	11.2	15.7	20.4	25.	28.5	31.7
Median for all cities <i>a</i>	13.3	18.1	20.8	25.6	28.4	30.3
Median for cities <i>b</i>	13.6	17.9	20.6	25.3	27.9	30.1
Multiplication						
Woody's Standard Median.	4.7	11.1	18.3	26.1	30.6	32.9
Median for all cities <i>a</i>	6.8	15.2	19.2	27.3	30.9	33.2
Median for cities <i>b</i>	6.2	14.9	19.	27.2	30.7	32.9
Division						
Woody's Standard Median.	5.8	9.9	16.5	23.8	27.4	30.1
Median for all cities <i>a</i>	7.6	13.5	19.6	25.1	28.4	30.
Median for cities <i>b</i>.....	.....	12.4	18.	24.2	27.7	29.3

¹ *a* includes all cities, *b* omits cities having only annual promotions, tested in April and May

Wisconsin children perform well on the fundamental operations in grades three, four and five. Their proficiency in the three remaining grades is not so evident, particularly when annual promotion schools tested in April and May are omitted. The best showing in the three upper grades is made in multiplication and the poorest in addition.

VARIATION BY CITIES

Table 29 gives the record in median scores for each city on each test given in that city. The median scores for all cities combined and Woody's standards are inserted for comparison. The records for the different cities are arranged approximately in order of the portion of the work for the grade completed at the time of the test.

TABLE 29.—Median Scores by Cities

Wis. cities	Date tested	Section tested	Addition					Subtraction						
			III	IV	V	VI	VII	VIII	III	IV	V	VI	VII	VIII
1	10/ 3/16	B	12.4	19.3	21.2	27.4	30.3	31.9	10.7	16.3	20.3	24.4	27.7	30.8
2	10/10/16	B	12.7	17.8	23.1	27.0	30.3	32.0	11.9	17.3	22.3	27.4	29.4	30.5
3	10/24/16	B	12.6	17.7	23.7	28.8	30.6	31.6	13.8	13.3	21.9	27.8	29.8	31.5
4	2/ 6/17	A&B	15.5	21.4	22.7	30.7	33.3	34.3	13.6	18.2	20.7	25.7	27.6	30.6
5	2/12/17	A&B	20.7	.....	.....	28.3	32.1	32.8	.....	18.5	19.9	25.0	.....	27.6
6	11/27/16	B	15.3	20.7	22.1	28.0	31.4	33.4	14.9	18.5	21.3	28.5	30.2	32.8
7	12/ 5/16	B	13.0	20.1	20.3	24.2	29.2	26.8	11.1	18.1	19.9	20.7	27.4	26.7
8	1/ 9/17	B	19.2	20.7	26.9	30.9	31.9	32.9	15.7	20.0	22.7	26.9	30.6	32.6
9	1/12/17	B	14.8	19.8	25.3	27.0	28.2	32.7	.....	.....	.....	.....	.....	.....
10	12/ 5/16	A&B	.....	18.5	20.9	27.0	30.0	.....	11.3	17.8	.....	.....	.....	29.0
11	3/27/17	A&B	16.6	19.5	23.3	29.3	32.4	33.2	13.4	18.4	20.5	25.2	28.7	29.2
12	2/26/17	A	14.4	17.5	20.6	23.8	31.2	33.1	12.6	17.9	20.1	24.2	27.5	.....
13	3/ 8/17	A	.....	19.0	20.5	26.8	30.8	32.5	.....	.....	.....	.....	.....	.....
14	5/ 8/17	A	12.5	.....	.....	.....	.....	.....	8.7	9.8	17.7	18.4	24.7	28.2
15	5/ 8/17	A&B	.....	.....	.....	.....	.....	.....	17.8	22.0	23.9	29.4	30.5	30.2
16	4/10/17	A	.....	.....	.....	.....	.....	.....	12.0	19.2	.....	.....	.....	.....
17	4/12/17	A	.....	.....	.....	.....	.....	.....	12.2	18.2	21.2	27.3	.....	.....
18	6/ 4/17	A&B	.....	21.8	26.4	28.6	32.0	31.8	.....	.....	.....	.....	.....	.....
19	6/ 6/17	A&B	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20	5/ /17	A	19.0	22.7	26.8	30.8	33.9	34.8	15.0	20.3	24.0	28.8	32.9	33.0
Median.....	.....	.....	15.5	20.2	22.7	28.4	31.9	33.1	13.3	18.1	20.8	25.6	28.4	30.3
Woody's Standard Median.....	.....	.....	14.5	18.3	23.1	29.8	32.4	34.0	11.2	15.7	20.4	25.0	28.5	31.7

TABLE 29—Continued

Multiplication					Division									
1	10/ 3/16	B	2.7	13.7	19.8	26.9	30.2	32.8	3.1	9.9	19.2	25.4	27.3	29.9
2	10/10/16	B	.....	12.4	21.4	29.5	29.7	32.9	.....	11.9	19.9	26.0	29.0	30.0
3	10/24/16	B	4.3	11.7	18.8	27.2	29.3	32.3	5.6	5.5	17.8	25.2	28.2	30.2
4	2/ 6/17	A&B	6.2	14.3	18.8	28.5	30.5	33.6	8.0	13.1	19.4	25.9	28.5	30.7
5	2/12/17	A&B	.....	.....	18.9	27.1	.....	.....	.....	.....	.....	.....	.....	.....
6	11/27/16	B	6.6	17.8	18.9	28.4	31.0	34.4	.....	13.3	20.5	27.6	31.0	29.9
7	12/ 5/16	B	8.0	12.8	16.1	18.6	27.0	29.6	.....	10.8	10.8	17.6	26.5	25.8
8	1/ 9/17	B	8.5	15.8	18.9	28.3	32.1	34.1	.....	12.8	18.1	24.3	28.8	31.1
9	1/12/17	B	.....	.....	18.9	.....	.....	.....	.....	14.3	16.0	25.4	24.6	27.7
10	12/ 5/16	A&B	5.1	8.5	.....	26.3	.....	.....	.....	10.4	.....	18.5	22.1	22.5
11	3/27/17	A&B	7.8	16.4	19.2	27.3	32.3	32.4	.....	11.6	16.5	23.2	27.5	28.2
12	2/26/17	A	.....	15.5	18.4	24.5	30.4	31.7	.....	11.8	16.9	20.2	29.0	28.7
13	3/ 8/17	A	.....	.....	.....	.....	.....	.....	.....	11.6	15.2	21.5	23.5	25.2
14	5/ 4/17	A&B	.....	20.5	23.5	30.5	32.4	35.0	.....	.....	.....	.....	.....	.....
15	5/ 8/17	A&B	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	4/12/17	A	.....	.....	22.5	24.5	.....	.....	8.7	9.8	17.7	18.4	24.7	28.2
18	6/ 4/17	A&B	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23.5	28.3
19	6/ 6/17	A&B	.....	.....	.....	26.5	29.1	33.9	14.8	.....	.....	25.0	29.5	29.4
20	5/ 1/17	A	11.2	14.2	.....	28.5	31.3	37.2	.....	.....	.....	.....	.....	.....
21	5/29/17	A	15.3	20.6	23.2	29.6	34.3	37.2	.....	13.9	18.9	24.2	29.5	31.6
Median.....			6.8	15.2	19.2	27.3	30.9	33.2	.....	18.5	24.7	28.3	31.2	32.8
Woody's Standard Median.....			4.7	11.1	18.3	26.1	30.6	32.9	7.6	13.5	19.6	25.1	28.4	30.0
									5.8	9.9	16.5	23.8	27.4	30.1

Table 30 gives the number of cities that equalled or exceeded Woody's standard and the number below for each grade and test.

TABLE 30.—*The Number of Cities Equalling or Exceeding Woody's Standard and Number Below*

	III	IV	V	VI	VII	VIII
Addition						
Number equalling or exceeding Woody's Standard.....	7	11	7	3	3	2
Number below Woody's Standard....	6	3	7	12	12	12
Subtraction						
Number equalling or exceeding Woody's Standard.....	12	14	9	10	6	3
Number below Woody's Standard....	3	2	5	4	6	10
Multiplication						
Number equalling or exceeding Woody's Standard.....	8	12	12	12	5	7
Number below Woody's Standard....	2	1	1	3	7	5
Division						
Number equalling or exceeding Woody's Standard.....	3	13	11	10	10	5
Number below Woody's Standard....	2	2	3	6	7	12

The results in addition

As indicated previously many Wisconsin schools appear to be weak in addition in the sixth, seventh and eighth grades. Only two cities make a good showing in all three of these grades. The larger of the two is a school having semiannual promotions tested very shortly after mid-year promotions. Addition appears to be well taught in this city. The other of these cities has only annual promotions. The tests were given late in the year and pupils should be expected to exceed the standard set. In grades three, four and five one-half or more of the schools represented exceeded the standard set. Drill in addition does not appear to be neglected in these grades. Giving the tests in a city late in the year is not necessarily a guarantee that such a school will exceed the standard in addition. Some schools tested late in the year did little if any better than others tested early in the year.

The results in subtraction

In subtraction again few cities are below Woody's standard in the third and fourth grades. Approximately two-thirds are

above in grades five and six. Half are above in grade seven, and only three out of thirteen in grade eight. The grammar grades again appear to be the weakest links in the chain.

The results in multiplication

Wisconsin schools make their best showing in multiplication. In the fourth and fifth grades only one city is below standard. Two are below in the third and three in the sixth. In the seventh five are above the standard and seven below. In the eighth these figures are reversed.

The results in division

The lower grades in most cities made a good showing in division. For obvious reasons few gave the test in grade three. In grade four only two are below standard. In grade five eleven of the fourteen cities did better than the expected standard. In the fifth and sixth grades many more are above than below, but not so in the eighth grade. Here only five of the seventeen cities reached Woody's standard.

Why do Wisconsin Schools Apparently do Well in the Work in Fundamental Operations in the Lower Grades and Fail in the Upper?

This is one of the most perplexing problems raised by the tests. Several factors may be involved. For one thing the teachers in the earlier grades clearly do not underemphasize drill. Then too Woody's standards for these grades may be somewhat low. The same can scarcely be said of the standards in upper grades. In view of the types and number of examples on each test, the upper grade standards do not seem high. The addition test contains 38 examples, the subtraction 35, the multiplication 39, and the division 36. This means that an eighth grade pupil might fail on four examples in addition and still do as well as Woody's standard. He might fail on three examples in subtraction, six in multiplication and five in division and yet be regarded as better than a median pupil. This is certainly a liberal allowance, particularly when we consider that the tests call for the application of no processes commonly introduced later than grade six. Only failures in denominate numbers

may be attributed somewhat to the courses of study. The Wisconsin Manual for rural schools, followed in part by some cities, discourages the teaching of these processes. What then accounts for the mediocre showing of the grammar grades? Simply a lack of sufficient facility in the manipulation of the necessary processes. Arithmetic is not wisely taught in these grades. Too little attention is given to the discovery of the specific needs of individual children upon which they need to be drilled. This may be seen better from a few typical illustrations.

Table 31 from the Janesville Survey gives the average eighth grade scores for each of five buildings on each of ten examples of the division test. The writer's observation of results on these examples in other schools has convinced him that Janesville did neither worse nor better than the average.

TABLE 31.—*Ten Troublesome Examples in Grade VIII*

Example	Per cent of pupils who solved each of ten examples correctly—for the city and by buildings					
	City	Buildings				
		1	2	3	4	5
$2 + 2 =$	71.9	64.5	61.1	89.7	71.4	69.7
$2.1)25.2$	67.6	61.3	66.7	65.5	75.	69.7
$25)9750$	77.7	74.2	77.8	79.3	82.1	75.8
$.003) .0936$	53.2	35.5	55.6	65.5	46.4	72.7
$3\frac{1}{2} + 9 =$	33.8	35.5	5.6	34.4	42.9	39.3
$\frac{1}{2} + 5 =$	51.1	48.4	27.8	51.7	64.3	54.5
$\frac{5}{4} + \frac{3}{5} =$	33.8	38.7	16.7	34.5	32.1	39.4
$52)3756$	45.3	38.7	61.1	41.4	57.1	36.3
$531)37722$	28.1	25.8	33.3	27.6	32.1	24.2
$9)69 \text{ lbs. } 9 \text{ oz.}$	18.	35.5	5.6	3.5	25.	15.
No. pupils taking test.....	139	31	18	29	28	33

Such extremely low scores are typical of many schools and can only be explained on the ground of insufficient teaching. An analysis of 1500 errors made by 182 seventh and eighth grade pupils on the division test showed that even though the test offered many more opportunities for errors in simple subtraction, multiplication and division such matters as failures to invert,

incorrect placing of the decimal, omission of ciphers in the quotient, and failure to reduce answers to lowest terms were among the most frequent sources of error.

How can teachers improve the ability of pupils in fundamental operations even though they may be doing as well as average children?

This is a question to which teachers may be inclined to give little thought if their pupils are doing average work. Frequently, however, either still better results could be obtained, or results that are just as good, could be had in less time. In the latter event the best pupils could have more time for other subjects. Teachers should study the needs of individual children much more than they do. For example in one city a fifth grade of 41 children was 0.8 of an example above Woody's standard on the test in subtraction, yet a study of the papers revealed the fact that one-half of the pupils had made errors in borrowing. Twenty-three pupils, while able to solve a number of examples in subtraction of fractions, failed to reduce answers to lowest terms or did not reduce correctly. The statement of an answer as $2\frac{2}{8} = 1\frac{1}{4}$ was common. One pupil in this class solved all of the examples in subtraction of fractions and two of the three in subtraction of denominate numbers, but missed three in subtracting decimals of the equation form. This child apparently could profit more if permitted to take sixth grade work in arithmetic. Such class deficiencies as indicated above, or such unusual proficiency as that of this one pupil too often pass unnoticed when the class as a whole is doing as well as average children. Often it is not until we examine closely the work of each individual that we discover the particular differences in the needs of the pupils of the same class.

In a sixth grade of 33 pupils tested in subtraction, whose median score was more than three examples above Woody's standard, 59 errors or almost two per pupil were in borrowing. These were contributed by 18 pupils. The errors were of two kinds, in one the pupil apparently disregarded the fact that he had previously borrowed, in the other he proceeded as though he had not borrowed when he really had. Eleven pupils made errors of the first sort and eleven made errors of the second sort, but strange as it may seem, seven of those making errors of the first kind made none of the second, and seven of those

making the second type of error made none of the first sort. From this it would seem that drill in examples with borrowing is needed for this class but some of the pupils need to have their attention called to particular kinds of borrowing. One pupil, for example, made eight errors through disregarding the fact that he had borrowed, but none through subtracting as if he had borrowed when he had not, and another pupil made five errors of the latter sort but none of the former.

In this same sixth grade 14 pupils gave $15\frac{5}{8}$ as the answer to the example $\begin{array}{r} 27 \\ 12\frac{5}{8} \end{array}$. Fifty errors were made because of failure

to reduce, or incorrect reduction of the fractional part of the answer to lowest terms. These errors were contributed by 24 pupils. Fifty-nine errors by 26 of this class occurred in subtraction of decimals of the equation type, that were due to incorrect placing of the subtrahend. In numerous instances minuend and subtrahend were interchanged. The class was clearly weak in this type of exercise. Twenty-six errors were made in fundamental combinations, and an equal number in placing of the decimal point. Errors of the former kind were limited to 16 pupils and the latter to 17.

The analysis of the errors made by these typical classes illustrates a type of study which teachers should make frequently, but which they rarely do. Teachers would often be amazed at the peculiar mental processes of pupils, if they were to have them retrace audibly, each step of an incorrect solution. Were teachers to study the needs of their pupils in such manner as we have described, it would result in more intelligent drill exercises. A class which revealed weaknesses in subtraction or division would not be drilled blindly upon subtraction or division, but the major emphasis would be placed upon the particular subtraction or division processes in which the class proved to be weak. Not only would there be a more careful selection of the type of exercise to be used for class drill, but a more intelligent direction of each individual pupil's energies. Such practice would either develop a greater degree of facility in manipulating the fundamental operations than most children now possess, or equal facility would be acquired with a smaller time expenditure.

SUMMARY AND CONCLUSIONS

Children in Wisconsin city schools perform well in the fundamental operations of arithmetic in grades three, four and five. The best showing for all grades is made in multiplication and the poorest in addition. Many schools are particularly weak in addition in grades six, seven and eight. The eighth grade in most schools is not only weak in addition but in subtraction and division as well. The high scores made in the three lower grades indicate that a greater amount of attention is being given to arithmetic in these grades than is necessary. This becomes more evident than ever when we consider that this unusual proficiency is lost in the upper grades.

The tests indicate wide differences in the arithmetical achievement among pupils of the same grade. The overlapping of performances from grade to grade is so great as to indicate that many upper grade children are doing little else than marking time. These wide variations and marked overlappings are to be attributed mainly to differences in the quality of the teaching, differences in native endowment, to improper grading and to unequal attendance. Some pupils apparently are attempting work that is beyond them and others are being permitted to proceed at a pace altogether too slow to tax their capacities. Teachers will need to make more careful and intensive studies of individual needs in order to discover how to help each pupil to improve and to advance at a rate commensurate with his abilities and needs.

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CHAPTER III

WRITING

Handwriting, though one of the original "three R's," is perhaps more often poorly taught than any other subject. It is a subject which, under haphazard methods of teaching, yields perhaps less on the time and money invested in teacher service than any other subject, and one which brings a large return with good teaching. The fact that writing is often poorly taught is due not alone to a lack of knowledge of the technique of teaching others to write well but to an entire absence of standards. It is exceptional to find a teacher who has any definite conception of how well children of a given grade should write with a given amount of training. With the development of the Thorndike, Ayres and others handwriting scales it has become possible to measure handwriting objectively. It is now possible to say that a given specimen of handwriting is as good as quality 12 on the Thorndike scale or quality 60 on the Ayres scale and that it was produced at a rate of a certain number of letters per minute. Through the application of these scales it is possible to say that a given quality of handwriting represents average performance for a given grade or that it is better or worse than the average. It is also possible to measure the amount of improvement over a given period of time, or the variation within grades, as well as to compare achievement this year with achievement last year.

In order that such data as these might be available for Wisconsin and in order to acquaint a larger number of teachers with methods of testing handwriting, instructions for giving a test and for scoring the papers were prepared. They were sent to each county superintendent, to principals of the County Training Schools and to each of the Normal schools. County superintendents were asked to give the test in five rural schools. Each training school was asked to test an equal number. Each nor-

mal school was asked to test three state graded schools. In addition the test was given in a number of cities under the personal direction of the writer.

The following letter of directions was sent to county superintendents in January 1917.

Office of State Superintendent

To County Superintendents:

We shall be very glad to receive your cooperation and assistance in establishing standards in handwriting for Wisconsin. The directions for testing the handwriting are as follows:

1. Schools to be tested—Select the last five rural schools taking alphabetically the surnames of the teachers.
2. Date of testing—Any time previous to March 1st.
3. Who shall conduct the test?—Preferably the superintendent or the supervisor, but it may be given by the teacher *if you are certain that she understands the directions perfectly.*
4. Directions to be followed by the tester—
 - a. Materials—Provide each pupil with *unruled* paper of uniform size. Use ink wherever possible.
 - b. Data to be secured from pupils—Have each pupil place upon the *back* of the sheet his name, age, grade, date, whether boy or girl, county, school and teacher's name.
 - c. Time to be allowed—Allow the children to write for exactly two minutes. The tester must have a watch with second hand.
 - d. What the children are to write—In grades 4 to 8 the series of words "one, two, three, four, five, six, seven," etc., as far as they can go in the time allowed *taking time to write well.* In grades 2 and 3 have them write only the words "one, two, three, four" and repeat as often as time permits writing well. Caution—Be sure that children know how to spell the words to be written. Instruct them to omit all commas.
 - e. Returning papers to the county superintendent's office—All papers are to be tied in a package, labelled with county, school, and teacher's name and forwarded to the county superintendent.

Each county superintendent will be sent a copy of instructions for scoring the papers and the necessary tabulation sheets.

Sincerely,

Supervisor of Educational Measurements.

Each county training school was asked to select the five rural schools most easily accessible, and each normal school to test the three state graded schools most easily accessible. The series of words indicated in the letter to county superintendents was used as a subject in all except in those tested by principals of train-

ing schools, where for certain reasons the sentence "one boy ate three apples" was substituted. A copy of directions for scoring the papers may be seen below.

Directions for Scoring Handwriting

1. Scoring papers for *quality* of handwriting.
 - a. Who shall score the papers?—Each paper is to be marked by three judges, preferably the county superintendent, the supervisor, and one other competent person. Each judge is to work independently.
 - b. Scale to be used—Thorndike (This may be secured from the Bureau of Publications, Teachers College, New York, 5c).
 - c. Judging the childrens handwriting—Compare each child's writing with samples on the scale without previous knowledge as to the mark assigned by any other judge. Place upon the *back* of each paper the number of the sample on the scale to which the child's writing most nearly corresponds in merit.
 - d. Computing the final mark on each paper—Take as the final mark the middle score, e. g. if a paper has marks of 9, 10, 11, its final mark is 10. If it has marks of 7, 8, 11, its final mark is 8. If two marks are alike that score is the final mark, e. g. if the marks are 9, 9, 11 assign it a final mark of 9.
2. Scoring the papers for speed of handwriting.

Determine the total number of letters written by each child in two minutes. You will find it to your advantage to prepare a score card which will indicate at a glance the total letters written if the last word written is "sixteen", "seventeen", etc., e. g. the words from one to fifteen inclusive total 74 letters. Correct for letters omitted or added. Count dashes or commas if present as letters.
3. Reporting scores to the office of the state superintendent.

Prepare one of the enclosed tabulation sheets for each school tested and forward to the office of the State Superintendent. The office will be glad to receive returns also from any schools scored with the Ayres Scale (Published by the Division of Education, Russell Sage Foundation, New York). If time permits it will be interesting and profitable to score by both scales.

In training and normal schools papers were scored by students and faculty members, under the direction of members of the respective faculties. In some cities the tests were scored by teachers and in others by students of the teachers training course after some preliminary practice in scoring.

THE RETURNS

Reports were received from twenty-four county superintendents, eleven county training schools, and three normal schools. Data were collected by the writer in eleven cities. The returns from county superintendents and training school principals represent 173 rural schools and 30 different counties. Two county superintendents made returns for more than five schools and three for less. In some cases the instructions to select the last five schools, taking alphabetically the surnames of the teachers, were not carried out because of difficulties entailed in reaching these schools. This has prevented in part what was intended to be a random selection but it is probable that it has not materially effected the results.

The results reported by county superintendents for speed of handwriting in a few cases were so high as to arouse suspicion as to the accuracy with which the time was kept. Accordingly a follow-up letter was addressed to each county superintendent reporting, asking in detail as to the conditions observed. In every case where the test was not given by either the county superintendent, or by the supervising teacher, and wherever it could not be stated that the two minute time limit had been explicitly observed, the results were rejected for speed. As a result of these eliminations the returns for only 141 rural schools representing 28 counties were used in computing the speed of handwriting for rural schools. Speed was recorded in only five of the eleven cities tested.

THE RESULTS—WHAT QUALITY OF WRITING DO WISCONSIN CHILDREN PRODUCE?

The distribution of scores. Table 32 gives the distribution of all pupils' scores in terms of the Thorndike scale for quality of handwriting. The median scores and Freeman's standard are also shown.

TABLE 32.—*Distribution of Scores for Quality of Handwriting—Thorndike Scale*

Quality	II	III	IV	V	VI	VII	VIII
4	18	7	.....	.....	.....	.....	.....
5	46	27	7	1	2	1	.....
6	76	64	39	12	10	6	5
7	194	233	168	99	43	19	15
8	197	350	334	238	174	100	90
9	121	300	371	362	364	260	224
10	29	60	126	134	137	138	121
11	26	67	129	125	196	226	223
12	2	24	45	62	83	114	140
13	1	12	15	30	60	69	82
14	.....	3	1	8	14	23	29
15	.....	.....	2	5	7	16	17
16	.....	.....	.....	1	8	7	24
17	.....	.....	.....	.....	1	2	6
18	.....	.....	.....	.....	.....	1	3
Total.....	710	1,147	1,237	1,077	1,099	982	979
Median.....	7.6	8.2	8.7	9.0	9.4	10.3	10.7
Freeman's Standard.	8.2	8.8	9.6	10.1	11.0	11.7	12.1

¹ Converted from Ayres to Thorndike units by Kelly's method of equating the two scales. "Each Thorndike unit equals 7.9 as great a distance as an Ayres unit."

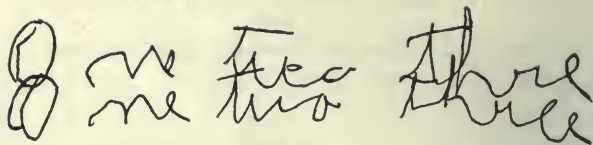
The scores range from those rated as of quality 4 scarcely legible as handwriting, to those rated as of a quality 18. Only 25 however were rated below quality 5 and only thirteen as better than 16. Some appreciation of the merit possessed by specimens rated at each of steps 4 to 16 of the Thorndike scale may be gained by reference to Figure IV.

The specimens are arranged in order of merit as judged by the scores. With the exception of the two specimens rated as 14 and 16, which are taken from the Thorndike scale, the specimens represent writing produced by children for the Janesville survey.

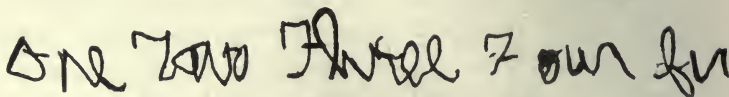
In grade two the quality of handwriting produced by Wisconsin children ranges from 4 to 13, and in grade eight from 6 to 18. While progress is evident from grade to grade there is a marked overlapping of achievements in writing. Considerable

Rated
at

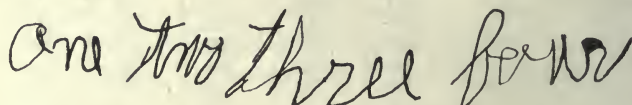
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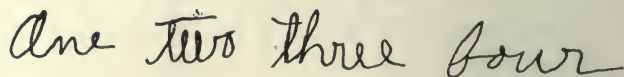
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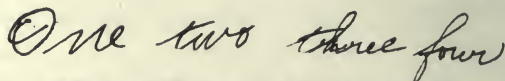
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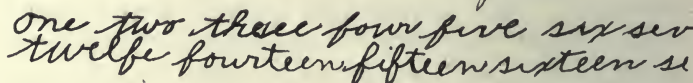
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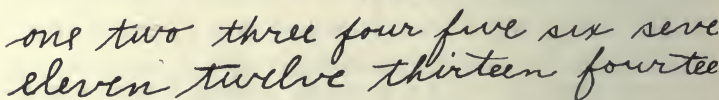
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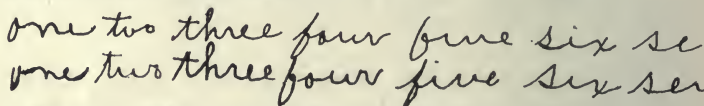
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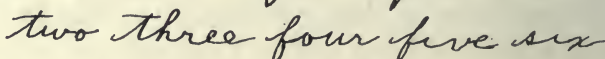
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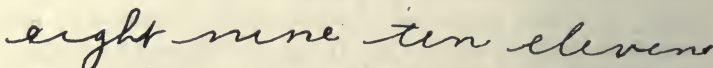
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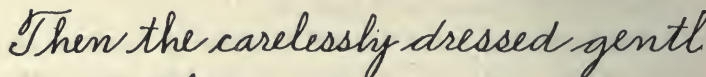
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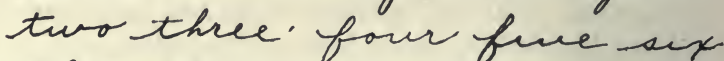
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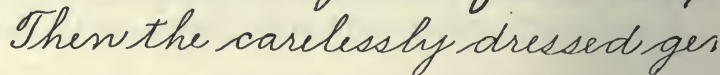
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Fig. IV. Specimens of Each Quality of Handwriting.¹¹ Reproduced from "An Educational Survey of Janesville, Wisconsin."

numbers of children in grades two and three excel many children in every grade above, including the eighth. The best writers in the second and third grades exceed the poorer half of the eighth grade. The poorest writers in the eighth grade do not write as well as average second graders. Some children are naturally good writers early in life. Others will make good writers only with unusually careful teaching. Children in the second grade whose writing already possesses the merit of quality 11 on the Thorndike scale will need to devote but little attention to improving their writing during the elementary school period. For these children it will be more profitable to spend much of the time ordinarily devoted to writing practice to other subjects.

TABLE 33.—*The Median Scores, the Lower and Upper 25 Percentiles and the Range of the Middle 50% in Quality of Handwriting*

	II	III	IV	V	VI	VII	VIII
Lower 25 percentile	6.7	7.3	7.8	8.2	8.6	9.0	9.1
Median	7.6	8.2	8.7	9.0	9.4	10.3	10.7
Upper 25 percentile	8.5	9.1	9.6	10.2	11.0	11.4	11.9
Range of middle 50%	1.8	1.8	1.8	2.0	2.4	2.4	2.8

While the median indicates the score that just half of the pupils were able to attain, it is desirable to know how well other portions of the children did and how widely these portions differ. Table 33, computed from Table 32, gives the median score, the lower and upper 25 percentiles and the range of the middle 50%. These figures are represented graphically in Figure V. The writing of the poorest fourth of the pupils did not exceed the figures representing the lower 25 percentile. That of the best fourth was better than the figures indicated by the upper 25 percentile. Subtracting the figures representing the upper and lower 25 percentiles we have the range of the middle half of the pupils. It will be seen that this is never much less than two steps. In the eighth grade it becomes almost three steps. That the writing attainments of half of the children should vary so much is surprising, but it becomes much more so when we consider that one-fourth of them were unable to write as well as the lower figure in Table 33 and another fourth wrote better than

the higher figure. The poorer writers have accomplished little for the time spent in writing. Every teacher should attempt to discover the reason for this. She should help each child to discover his particular shortcomings and how they might be remedied.

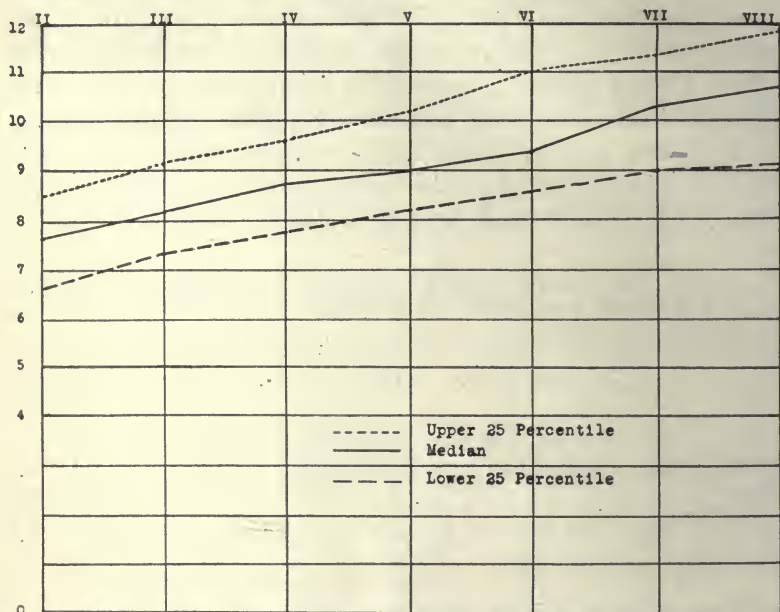


Fig.V. The Median Scores and the Lower and Upper 25 Percentiles in Quality of Handwriting

The median performances

The median¹ or middle performance for each grade for 7,231 Wisconsin children in rural, graded and city schools, and for children in each separate class of schools may be seen in Table 34. For purposes of comparison the median scores for 28,000 Iowa children and for children in the better half of 56 cities tested by Dr. Freeman are also given.²

¹ The median score means that just half of the children in any given grade wrote better than this and half did not write as well.

² The Iowa and Freeman scores have been converted from terms of the Ayres scale to the Thorndike scale by Kelly's method.

TABLE 34.—*The Median Scores in Quality of Handwriting for Each Class of Schools—Thorndike Scale*

	II	III	IV	V	VI	VII	VIII	Number children tested
11 Cities	7.5	8.0	8.6	9.0	9.3	10.5	10.7	3,866
9 Graded schools	7.5	7.8	8.2	9.0	9.5	9.3	10.0	720
30 Counties (173 Rural schools)	7.7	8.5	8.6	9.1	9.5	10.3	10.7	2,645
Wisconsin median	7.6	8.2	8.7	9.0	9.4	10.3	10.7	7,231
*Iowa standard	8.3	8.8	9.4	10.0	10.4	11.0	11.5	28,000
*Freeman's standard....	8.2	8.8	9.6	10.1	11.0	11.7	12.1	56 cities

* Converted from Ayres to Thorndike units by Kelly's method of equating the two scales. "Each Thorndike unit equals 7.9 as great a distance as an Ayres' unit."

The writing of Wisconsin children on the whole shows distinct progress from grade to grade. This is true for each class of school though in certain cases the improvement is slight. There is little difference in the median quality of the handwriting produced in each class of school. Variations of from 0.1 to 0.3 are not more than might reasonably be expected where the scoring was done by judges with a limited amount of training. The graded schools alone depart rather sharply in some grades from the median for all schools. The returns from this class of schools are scarcely large enough in number however to be representative of all state graded schools.

When compared with Iowa children, Wisconsin children do not make a favorable showing. Iowa children lead by a margin varying from 0.6 of a step to an entire step. This margin of superiority for Iowa children, instead of decreasing, mounts higher as we proceed from the lower to the upper grades. This is difficult to explain unless it be that the time given to the teaching of handwriting in Wisconsin has not been used to the best advantage. Successful results in handwriting require not only that time be spent in writing, but that the art of writing be well taught. Fifty minutes per week which represents the average amount of time given to handwriting in American cities¹ should be sufficient time in which to accomplish satisfactory results. How Wisconsin writing compares with that of Iowa and with Freeman's standard may be seen from Figure VI.

¹ See Holmes' study in the "14th Year Book of the National Society for the Study of Education."

How well may Wisconsin children be expected to write?

Good schools should not tolerate mediocre performances in any subject. If the scores given above represent how well Iowa and Wisconsin children can write without any serious attempt to bring about good writing, what may we expect when it is well

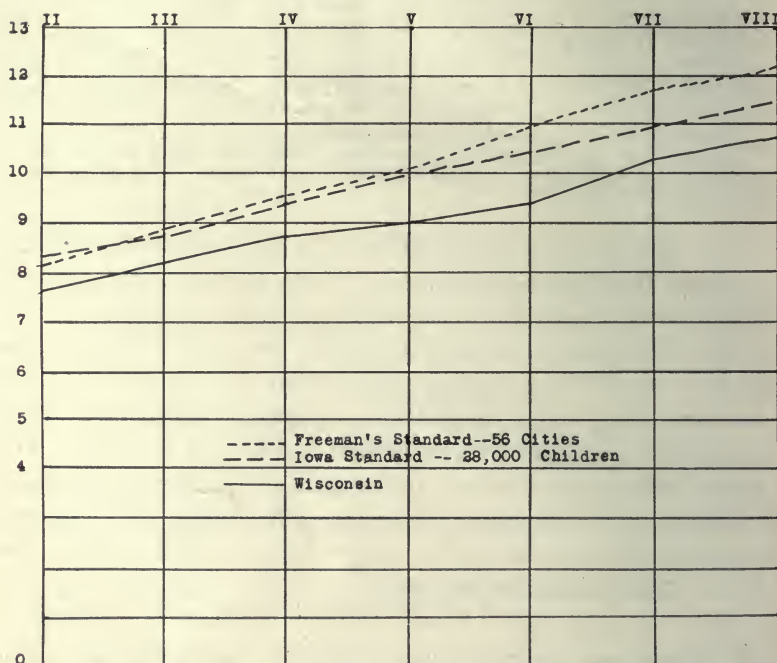


Fig.VI. The Quality of Handwriting in Wisconsin Compared with the Freeman and Iowa Standards

taught? The scores represented by Freeman's standard in Table 34 give us at least a tentative goal to be attained. Is there any valid reason why Wisconsin children may not be expected to reach this standard? With a concerted attempt to improve the quality of handwriting it should be possible to do so in the near future. Quality 12, Figure VII, which represents approximately median eighth grade performance by the Freeman standard is not too much to expect of children who are about to leave the elementary school and who will receive little if any systematic training in handwriting thereafter.

Freeman's standard was derived by computing the median scores made by the better half of fifty-six cities tested. It rep-

resents at least an entire school tested in each of these cities. The specimens for the fifty-six cities were scored by a single individual and are therefore to be considered as possessing a satisfactory degree of validity.

12 *lightly into Warren's carriage and held out a small card, John vanished behind the bushes*

Fig. VII Quality 12 on the Thorndike Scale Representing Approximately Freeman's Eighth Grade Standard

Variation by schools. Are all schools equally successful?

The median scores by counties representing the attainments in rural schools are given in Table 35.

TABLE 35.—Median Scores in Quality of Handwriting—By Counties

Counties	II	III	IV	V	VI	VII	VIII	No. children tested
1.....	8.3	8.4	8.3	9.4	10.3	9.3	10.7	71
2.....	7.5	9.0	8.4	10.0	9.5	9.5	10.3	74
3.....	8.0	8.4	9.1	9.2	9.3	.....	8.5	79
4.....	6.8	7.9	7.9	8.6	8.6	9.8	12.0	150
5.....	7.5	8.3	8.2	8.9	9.5	10.5	9.8	56
6.....	8.3	9.3	8.6	8.6	9.1	10.8	9.7	109
7.....	6.5	7.4	7.1	7.6	9.0	9.0	11.0	121
8.....	8.8	9.2	9.4	9.8	10.8	11.0	13.8	99
9.....	7.1	8.5	8.6	8.5	10.0	9.5	9.3	83
10.....	7.6	7.9	8.0	8.6	9.1	9.1	9.6	214
11.....	8.3	9.2	11.5	9.7	9.0	9.3	11.0	65
12.....	7.7	9.0	9.4	9.1	9.3	10.1	11.3	72
13.....	8.3	11.0	9.8	11.2	13.7	14.7	14.6	167
14.....	6.9	7.0	7.4	9.8	10.8	10.7	10.5	68
15.....	8.0	8.3	7.8	8.6	8.9	10.8	9.1	70
16.....	8.3	7.5	8.1	9.3	9.0	10.0	10.5	43
17.....	6.8	7.8	9.0	8.3	8.0	10.0	10.8	66
18.....	8.5	9.3	11.3	12.8	13.0	13.8	12.3	85
19.....	8.0	7.8	.....	9.1	9.3	9.0	11.1	47
20.....	7.8	7.9	8.9	8.8	9.1	11.0	9.0	82
21.....	8.9	10.1	9.2	10.8	11.5	11.9	11.0	97
22.....	7.3	9.4	8.0	10.5	11.2	9.4	10.8	77
23.....	7.5	8.4	8.7	8.3	9.0	9.3	10.5	151
24.....	8.0	8.5	8.4	9.3	9.0	9.5	.....	87
25.....	7.1	9.5	10.7	12.3	13.5	12.0	14.8	57
26.....	6.0	8.6	8.8	9.0	9.3	8.9	10.5	46
27.....	8.2	8.5	8.4	9.0	10.0	8.5	10.7	74
28.....	8.1	8.8	9.1	8.9	9.0	10.0	10.8	71
29.....	8.0	8.6	9.2	10.5	9.3	11.4	10.8	82
30.....	8.1	7.9	8.3	10.0	10.7	10.8	10.3	82
Median for 173 rural schools...	7.7	8.5	8.6	9.1	9.5	10.3	10.7	2,645

Considerable variation is to be noted. Some counties apparently secure much better results than others. The validity of the results is effected somewhat however by the small number of

children tested and also by the limited amount of training possessed by the scorers. Table 36 gives the median scores for each of eleven cities arranged in approximate order of the portion of the work of the grade completed. The Iowa and Freeman standards are again inserted for purposes of comparison.

TABLE 36.—*Median Scores in Quality of Handwriting for Eleven Wisconsin Cities—Thorndike Scale*

Cities	Date Tested	II	III	IV	V	VI	VII	VIII	No. children tested
1.....	9-28-16	.....	.....	.....	9.4	9.3	.....	.....	52
2.....	10- 9-16	.....	7.6	8.9	9.2	9.5	10.9	10.8	414
3.....	10-23-16	.....	8.6	9.2	9.2	9.4	11.3	8.8	405
4.....	12- 5-16	.....	8.2	8.6	7.9	8.8	9.2	9.8	313
5.....	12- 8-16	.....	8.8	9.0	8.9	10.3	10.0	9.7	434
6.....	3-29-17	7.3	7.8	8.9	9.1	9.5	10.2	11.0	1,061
7.....	5-10-17	.....	7.8	8.4	9.4	8.7	9.4	11.1	288
8.....	3- 6-17	.....	7.8	8.4	8.9	9.3	10.9	11.0	456
9.....	3- 8-17	8.3	8.6	9.2	9.3	10.5	10.7	12.1	138
10.....	4-10-17	8.0	7.7	8.1	8.7	9.1	11.2	9.4	223
11.....	4-12-17	6 0	8.3	8.8	8.0	8.9	9.0	12.0	82
Combined City Median		7.5	8.0	8.6	9.0	9.3	10.5	10.7	3,866
Butte	June.....	8 2	8.0	8.8	8.9	11.6	11 2	12.1	
Des Moines	Sept.....	.....	7.3	8.1	8.4	8.9	9.5	10.0	
Salt Lake	June.....	.....	9.3	10.7	10.9	11.2	12.1	13.1	
Starch's standard	.....	7.5	8.2	8.7	9.3	9.8	10.4	10.9	
Freeman's standard ¹	.....	8.2	8.8	9.6	10.1	11.0	11.7	12.1	
Iowa ¹	.....	8.3	8.8	9.4	10.0	10.4	11.0	11.5	

¹Converted from Ayres to Thorndike units by Kelly's method of equating the two scales. "Each Thorndike unit equals 7.9 as great a distance as an Ayres unit."

The highest scores for each grade are indicated in bold face type. It is evident that were all schools to achieve the results obtained by the city making the highest score in each grade, Wisconsin schools would compare favorably with schools elsewhere. They would then equal the median Iowa handwriting in two grades, exceed it in three, and fall below in two. They would equal the Freeman standard in two grades, exceed it in one and fall below in four. Certainly the scores made by these schools would be none too high to expect where writing is well taught. It is to be noted that four of the highest scores for the different grades were made in one city. This is a comparatively small city using a certain popular method of handwriting. The specimens were scored by members of the teacher training class of the high school under the personal supervision of the writer. They were scored after a period spent in practice judging upon samples of

known value. It is difficult to account for the very low scores made by children in some cities in certain grades. A few cities do not make a satisfactory showing in any grade. The scores point to but one conclusion—*writing is not well taught*. Results are not commensurate with the time given to the subject.

THE RESULTS IN SPEED—HOW RAPIDLY DO WISCONSIN CHILDREN WRITE?

The median scores in speed

Table 37 gives the median scores in speed of handwriting for each class of school and for all schools combined. These may be compared with the median achievements for Iowa children and for the children in the better half of 56 cities selected by Freeman. The median scores in speed in all schools combined and for the Iowa and Freeman standards are represented graphically in Figure VIII.

TABLE 37.—*The Median Scores in Speed of Handwriting for Each Class of Schools*

	II	III	IV	V	VI	VII	VIII	Number children tested
5 cities.....	29.9	43.	54.6	62.	61.9	75.8	78.9	1,985
9 graded schools.....	36.7	48.1	61.5	71.	82.5	84.3	96.3	720
28 counties (141 rural schools).....	36.9	56.1	59.3	69.4	73.	78.8	88.	2,079
Wisconsin Median....	34.2	49.6	57.2	66.4	68.2	77.9	84.7	4,784
Iowa Standard.....	39.2	49.6	61.9	65.5	72.6	75.	76.5	28,000
Freeman's Standard.	36.	48.	56.	65.	72.	80.	90.	56 cities

Table 37 shows that in the matter of speed state graded schools lead over rural and city schools. This lead is quite marked in grades six, seven and eight. Referring to Table 34 showing the quality of handwriting it appears however that speed has been gained at a sacrifice of quality. It is only in grades five and six that the graded schools excel the record for all Wisconsin children in speed, and yet maintain a quality as good as they. The high rate of speed attained in graded schools is much above either the Iowa or Freeman standards in grades five, six, seven, and eight, but the quality is much below either of these stand-

ards in each of these grades. Rapid writing is desirable but it must be accompanied by a satisfactory quality of the product.

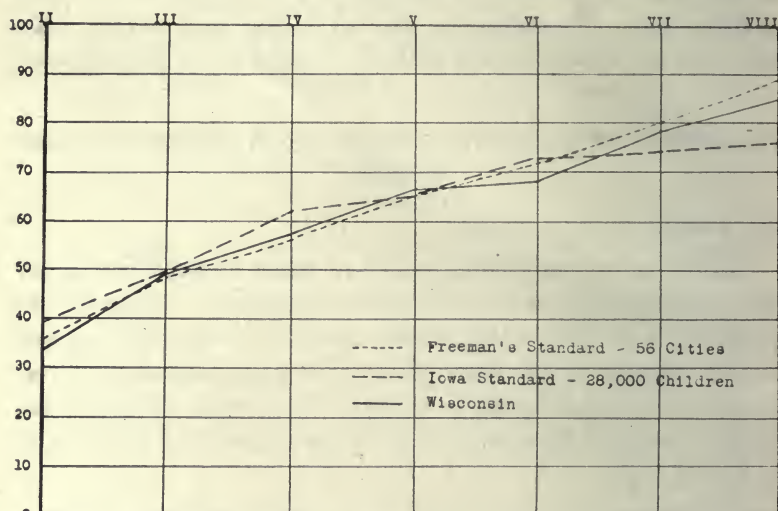


Fig.VIII The Median Speed of Handwriting for All Schools Compared with the Iowa and Freeman's Standards

In justice to these schools it may be said that the series of words used may have tended to cause an undue effort to be placed upon speed. The series was not different however from that used in cities and in most rural schools. Furthermore when the median speed for the two groups of rural schools, each using a different series of words, are compared it is seen that only in some grades did those using the series, "one two three four," etc. write at a higher rate of speed than did those using the series, "one boy ate three apples." This may be seen from Table 38.

TABLE 38.—The Median Scores in Speed in Rural Schools Writing the Words, "One, two, three, four," etc., and in Those Writing "One boy ate three apples"

	II	III	IV	V	VI	VII	VIII
"One, two, three, four," etc....	35	56.5	55.9	71.1	73.3	78.8	90.4
"One boy ate three apples"....	41	55.4	64.2	65.	72.6	78.8	81.8

Referring again to Table 37 it will be seen that city children, as far as the cities which reported scores in speed are representa-

tive of all cities, do not write as rapidly as children in rural and graded schools, nor as rapidly as Freeman's standard. They exceed the Iowa standard in grades seven and eight.

Rural schools on the whole make the best showing of Wisconsin schools in writing. Their quality is not inferior to that of other classes of schools and their speed is more nearly in accord with desirable standards in most grades.

When the combined results for all schools in speed of handwriting are compared with Iowa scores and with Freeman's standard, (Figure VIII), Wisconsin children are not as a whole slower writers. They probably write as rapidly as average children who have not been taught to write with any particular attention being given to their rate of writing. It is in point of quality that Wisconsin children fail to do well. They should be expected either to produce a higher quality at their present rate of writing or to produce their present quality at a higher speed. It is when both speed and quality are considered together that Wisconsin children do not appear to have attained a high grade of efficiency in handwriting.

Variation in speed of writing within grades

Whether children of a grade write about equally rapid may be judged from a distribution table for all of the scores. The distribution of scores in speed of handwriting for 4,784 children representing 141 rural, 9 graded and 5 city schools is shown in Table 39. How much children of a given grade vary in the rate

TABLE 39.—*Distribution of Scores For Speed of Handwriting*

Speed	II	III	IV	V	VI	VII	VIII
0-20.....	82	28	23	17	8	4	.....
21-40.....	293	207	134	61	50	27	18
41-50.....	110	150	113	81	63	36	14
51-60.....	45	157	174	114	119	60	50
61-70.....	95	99	157	107	130	105	74
71-80.....	13	59	99	126	118	122	106
81-90.....	7	39	53	83	89	123	108
91-100.....	5	12	18	55	54	80	122
101-110.....	.....	2	13	26	33	48	66
111-120.....	.....	1	2	5	18	27	37
121-130.....	.....	2	2	4	4	15	14
131-140.....	.....	1	1	3	3	7	6
141-150.....	.....	.....	.....	.....	2	.....	4
151-160.....	.....	.....	1	1	.....	2	7
161-170.....	.....	.....	.....	.....	1	.....	.....
Total	580	757	790	683	692	656	626
Median	34.2	49.6	57.2	66.4	68.2	77.9	84.7

of writing may be judged from the range of the scores in each grade. In grade two the rate varies from that of 82 pupils who wrote less than 21 letters per minute to that of 5 pupils who produced more than 90 letters per minute. In other grades the range is even greater. It is evident that some children in each grade write with a speed several times that of others in the same grade. The marked overlapping (i. e. children of a lower grade exceeding the speed of others in grades above) appears to indicate that some children begin as slow writers and continue to be slow writers throughout. Others are rapid writers early in their school life and continue to be rapid writers. This supposition if correct contains an important implication for teachers. If the habit of writing rapidly is to be developed, teachers must consciously train pupils in that direction. Left to proceed without guidance, there is little assurance that a pupil will develop even a fair rate of writing. The presence of pupils in grades six, seven, and eight, Table 39, who do not write more than 60 letters per minute is to be regretted. Unless strenuous efforts are made in the near future these children will leave the elementary schools with writing habits too slow for efficiency in the business and commercial world, or any other occupation requiring the use of writing.

THE RELATION OF SPEED AND QUALITY

To discover opportunities for improvement, the variations in both speed and quality need to be considered. Do all the children of a grade write about equally well or equally rapid? Do some schools produce good but slow writers? Do others produce poor but rapid writers? Are there others in which children write both well and rapid or both poor and slow? The variations in quality were noted in Table 32. Those for speed were shown in Table 39. Unfortunately in most cases it did not appear feasible to request that results be recorded in a form that would indicate the scores in both quality and speed for the same pupils. Some appreciation of the relation which may be expected can be judged from the results in one grade in Janesville shown in Table 40.

TABLE 40.—*Distribution of Handwriting Scores in Speed and Quality for Grade Seven*

Quality	Speed										Total
	0-40	41-50	51-60	61-70	71-80	81-90	91-100	101-110	111-120	121-130	
5.....	1										1
6.....											2
7.....			1	1	1		1		1		9
8.....	1	1	6	3	8	12	5	2	2		44
9.....		3	1	5	10	2	2	2			23
10.....		1	1	5	10	8	9	5	3	2	44
11.....	2					3	3	1			10
12.....		2				3			1	1	8
13.....			3			1					1
14.....											
Total	4	7	18	25	34	26	14	8	4	2	142
Median.....											10.2

From Table 40 it will be seen that some pupils are both poor and slow writers. There are others who write well and rapidly. Still others write at a fair rate of speed, but their quality is poor. Some produce a fair quality, but have a low rate of speed. It is desirable that children produce writing of good quality at a fair speed. Evidently some children need to improve in quality, some in speed and others in both.

The scores in both speed and quality for the five cities reporting both are shown in Table 41. City No. 3 on the whole makes

TABLE 41.—*Median Scores in Both Speed and Quality for Five Cities Reporting Both*

Cities	II	III	IV	V	VI	VII	VIII
1. Quality	6.0	8.3	8.8	8.0	8.9	9.0	12.0
Speed	24.4	48.0	61.7	55.0	68.3	66.3	73.0
2. Quality		7.8	8.4	9.4	8.7	9.4	11.1
Speed		19.0	44.7	75.5	65.8	80.2	91.1
3. Quality	8.3	8.6	9.2	9.3	10.5	10.7	12.1
Speed	33.8	48.2	59.6	68.4	63.0	61.6	
4. Quality	7.3	7.8	8.9	9.1	9.5	10.2	11.0
Speed	26.1	45.5	56.3	56.5	56.6	75.6	77.5
5. Quality		7.8	8.4	8.9	9.3	10.9	11.0
Speed		44.2	63.4	69.9	70.7	81.5	77.0

the best showing in quality and city No. 5 makes the best record in speed. Taking both quality and speed together, these two cities are superior to the other three. Apparently those that place more emphasis on speed get better results in quality.

Figure IX is intended to represent in graphic form a combination of the scores for quality and speed for each type of school. The portion of the bar to the left represents the median score in quality and the portion to the right the median score in speed in each case. The total length of the bar may be taken to represent a combination of speed and quality.

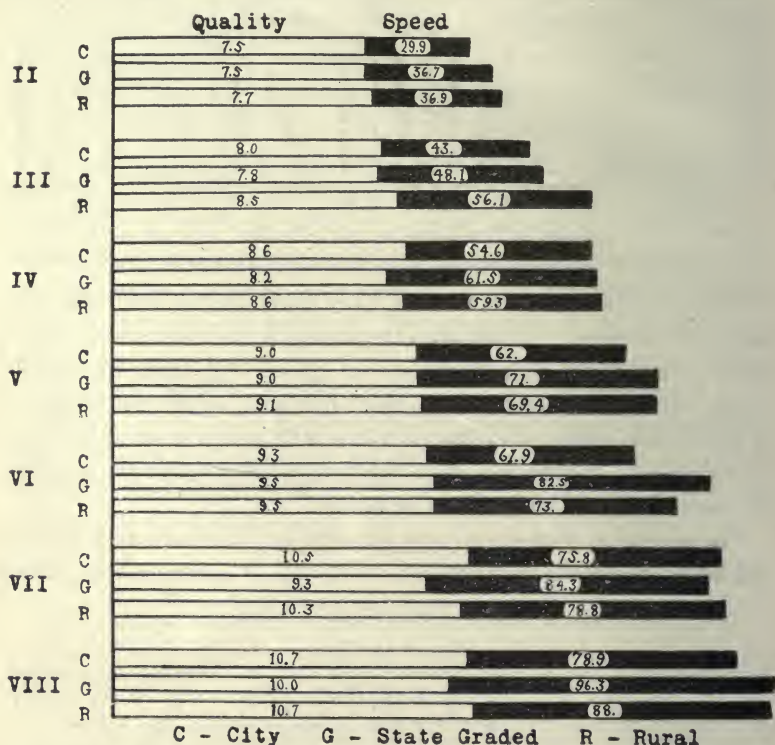


Fig. IX. Speed and Quality of Handwriting in Each Class of Schools by Grades

SUMMARY AND CONCLUSIONS

The quality of writing in Wisconsin schools is only fair. It is not as good as that of Iowa children. Exceptions, however, occur. Some schools are markedly superior to others. There are some good writers in every school. The attainments of many of the children however represent an insufficient return upon the time invested. Fifty minutes per week is sufficient time to secure good results, but many fail to do so because of poor teach-

ing. Children who exhibit unusual skill in their writing attainments should be permitted to devote much of the time ordinarily given to writing to other subjects. This may serve also as an incentive to others to improve. The handwriting of pupils whose product is poor should be carefully studied to discover the teaching needs of each. In studies of this type the Freeman handwriting scale will be found helpful. When writing is well taught schools should be able to reach the standards set by Professor Freeman.

Wisconsin children are not on the whole slow in their speed of writing. When speed and quality are taken together, however, they do not compare favorably with Iowa children or with the standard set by Freeman. Rural schools make the best showing when both factors are considered. In state graded schools speed seems to be attained at the price of quality. Rapid writing is to be desired but it must be produced at a fair quality. The fact that some write several times as rapidly as others, and the fact that Wisconsin children write as rapidly as average children without having given particular attention to speed, suggests that a gain could be made if teachers made a conscious effort to improve the speed of slow writers. Rate of writing becomes a fixed habit which should be shaped early in life. Under present conditions some children will leave school with a writing rate too slow for efficiency in any line. Much as some may stress the use of the typewriter the ordinary man writes with his hand. The grocery clerk, the saleswoman, the office worker, the banker, the reporter, the army clerk, and the teacher are all required to take notes which call for legibility and speed. Both must be stressed in the teaching of handwriting. Some children need to improve the quality of their writing, others their speed, and some both.

SOME SUGGESTED REFERENCES

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- Lister, C. C. *Muscular Movement in Handwriting*. Macmillan.

Helpful suggestions will also be found in the published courses of study of various places.

CHAPTER IV

COMPOSITION

An attempt was made to measure success in English composition in fifteen schools. In each case the test was given and scored under the immediate direction of the writer. The subject used was, "How I Should Like to Spend Next Saturday."¹ Pupils were instructed to write a composition not to exceed one page in length. Twenty minutes were allowed. No preliminary discussion of the subject was permitted. The "Hillegas Scale for Measuring English Composition" and the "Trabue Nassau County Supplement to the Hillegas Scale" were used in rating the papers. The former was employed in schools tested during the first half of the year. In schools tested during the second semester both scales were employed. If scores were to be recorded in terms of one of the scales, the other was used as a reference to enable the scorer to verify his judgment of a given specimen.

The Trabue scale reproduced below consists principally of specimens written upon a subject almost identical with that used in the test. This made it more serviceable than the original Hillegas Scale and removed the criticisms sometimes offered against the Hillegas Scale, namely, that a number of the specimens are not original productions of children.

THE TRABUE SCALE

What I should like to do next Saturday

Value

0. I went going on to the Dox Saturdayer dnd day we the boys and I well going home and I well going the boys. and I will going these read in and they to night. and we or night. I well going a ground shalt and I gone out I will going to shea shouse and I will shoe or the skill of the shea of night.
- 1.1 I intend to mak a snou man and make an fort and fort snou ball at chidern and hau I whist ma frant carolyn cole what were me I will going to the mauiss on Saturday.
- Georgia will come went me.

¹ In a few cases *Should* was inadvertently given as *Would*.

- at night I will going out went my mother to the marce
 I will mak the snou man and the fort in the moning and in
 the afternoon I will go to the mauies.
 I whist there whest school on Saturday
- 1.9 one next S aturday I expect to go to the city leve next G atur-
 day to see my ofriend archie king I am going to grow to the
 baning balys circus with hime next S aturday fefore I go I have
 to do my jobs feedsing the cows ard horse ard chinkens and
 geese next Saturday
 My friend is a very good fellow to go and see So my mother
 S aid "If I do my work during Easter week vacation I can go
 to the barning baley circus with hime
- 2.8 Once a pon a time there was a girl. One day she asked
 me what I was going to do next Saturday so I said, "I am going
 to go for a swim." And she said, "thats
 just were I am going to." next Saterday came we both went
 down together. We came home at noon time. after dinner we
 went to the picttures. There we had a good time. And then
 came home at night.
- 3.8 I would like to go out in the after noon and play catch-
 ing the ball. Go over to Bertha's house and have a few girls to
 come with me and be on each others side. I have a tennis
 ball too play with. The game is that one person should stand
 quite aways from another person and throw the ball too one
 then another. Someone has to be in the middle and try too get
 the ball a way from someone then she takes this persons place
 who she caught the ball from. Then till every person has a
 chance.
- 5.0 Next Saturday I should like to go away and have a good
 time on a farm. I should like to watch the men plowing the
 fields and planting corn, wheat, and oats and other things
 planted on farms.
 Next Saturday I will go the Pioneer meeting if nothing hap-
 pens so that I cannot go. I should like to go swimming but it
 is not warm enough and I would catch a bad cold. I should like
 to go to my aunts and drive the horses, I do not drive without
 some older person with me, so I cannot go very often.
 I should like to see my aunts cat and her kittens, too. I think
 I can, to.
- 6.0 I should like to join my girl friends, who are going to
 the city on the 9:05 A. M. train. They are going shopping in
 the morning and will have lunch to-gether, then they are going
 to the Hippodrome. After the Hippodrome, they are all going
 home to dinner to one of the girls houses, she lives on Riverside
 Drive so they expect to take the "Fifth Avenue Bus" up there.
 The evening will be devoted to playing games, singing and
 dancing.
- 7.2 If I had a thousand dollars to spend, I think I would take
 a trip to San Francisco by train with the rest of the family,
 and stop at a sea-side hotel. It would be glorious to see the
 surf again, and to escape from the cold blustering weather of
 December for the balmy breezes of the ocean, and the whiff of
 orange blossoms.
 We could take long drives under shady trees, visit the orange
 and olive groves and bathe in the surf. Think of bathing in the
 ocean in December!
 Coming home again I should enjoy stopping at Yellow Stone
 Park. It would be lots of fun to camp out, and to ride over the

prairies on frisky ponies. It would be very interesting to notice the change of climate as we got farther east, and to go to bed on the train one evening feeling warm, and waking up the next morning feeling very chilly.

I am afraid by the time I would get home a thousand dollars would be pretty well used up; but if not I would like to give a party.

8.0 One Sunday, towards the end of my summer vacation, I was in bathing at the Parkway Baths. In the Brighton Beach Motordrome, a few rods away, an aviation meet was going on. Several times one of the droning machines had gone whirring by over our heads, so that when the buzzing exhaust of a flier was heard it did not cause very much comment. Soon, however, the white planes of "Tom" Sopwith's Wright machine were seen glimmering above the grandstand. Everyone stood spellbound as he circled the track several times and then headed out to sea. He was seen to have a passenger with him. Suddenly, the regular hum of his motor was broken by severe pops, and the engine ran slower, missing fire badly. In response, to Sopwith's movements, the big flier tilted and swooped down to the beach from aloft like an eagle. The terrified crowd made a rush to get out of the way as the airship came on, but Sopwith could not land on the beach, but skimmed along close to the water instead. Suddenly his wing caught the water, and the big machine somersaulted and sank beneath the waves. The aviators soon came bobbing up and were taken away in a launch, but the accident will not soon be forgotten by those who saw it.

9.0 The courage of the panting fugitive was not gone; she was game to the tip of her high-bred ears; but the fearful pace at which she had just been going told on her. Her legs trembled, and her heart beat like a triphammer. She slowed her speed perforce, but still fled industriously up the right bank of the stream. When she had gone a couple of miles and the dogs were evidently gaining again, she crossed the broad, deep brook, climbed the steep left bank, and fled on in the direction of the Mt. Marcy trail. The fording of the river threw the hounds off for a time; she knew by their uncertain yelping, up and down the opposite bank, that she had a little respite; she used it, however, to push on until the baying was faint in her ears, and then she dropped exhausted upon the ground.

The first sample on the scale is very poor in quality. Each successive sample represents increased merit. The merit increases by approximately equal increments as may be judged from the values attached to the successive samples, 0, 1.1, 1.9, 2.8, 3.8, 5, 6, 7.2, 8, 9. The value attached to each sample is the result of a large number of judgments based upon the theory that differences equally often noticed are equal. Thus if one-half of the judges estimate a given specimen A as possessing more merit than another specimen B and one-half estimate B as superior to A, the best we can say is that the two possess equal merit. Were all of the judges to rate B as superior to A we would know that B is better than A, but not how much better.

But if only 75% of the judges consider B as better than A, then B is superior to A by some definite amount. If in addition 75% of the judges regard a third specimen C as better than B, and an equal per cent regard a fourth specimen D as better than C, and so on, we have the essentials of a scale. Each successive sample then represents a uniform increase in merit, and this uniform increase (i. e. an increase which 75% of judges recognize) becomes the unit to be employed in constructing the scale. It was through a process such as this that the samples on the scales were selected from a large number of specimens. Specimens which did not conform to the "75%" distribution of judgments, were rejected. As a matter of fact the scale makers did not find an entire set of specimens that conformed to this requirement, but they selected those which most nearly did so. It is for that reason that instead of having a scale with values 0, 1, 2, 3, 4, 5, etc. we have 0, 1.1, 1.8, 2.8, 3.8, 5, etc.

To use the scale we place the pupil's specimen beside the scale and find the particular scale sample to which the child's production most nearly corresponds in general merit. It is best to find first a sample on the scale which is not as good as the pupil's specimen. Then a second scale sample should be found which is clearly superior to the child's production to be rated. This establishes the limits within which the correct value of the specimen we are rating lies, and facilitates the work of scoring. This method was used in each school tested. Where doubt arose as to whether a given specimen deserved the mark of a particular scale sample, e. g. 5, the scorers were instructed to compare it with the scale sample just above, i. e. 6, and the sample just below i. e. 3.8. If the pupil's specimen appeared to be better than the scale sample below, but not as good as the one above, i. e. better than 3.8 but not as good as 6, it was to be given the mark of the intermediate step, in this case 5. The mark was placed on the back of the specimen, obscured from view, and the paper rated by a second judge. If the two judges agreed the paper was not scored further. If they disagreed it was rated by a third judge. Then if two of the scorers agreed their mark was taken as the final mark. If all three differed the intermediate mark was taken, on the assumption that one judge rated it too high and the other too low.

Before scoring the papers of an actual class the teachers who rated the specimens were given some preliminary practice in the use of the scale. For this purpose selected specimens of known value from Thorndike's "English Composition, 150 Specimens Arranged for Use in Psychological and Educational Experiments," were used in many cases, though not in all. As a part of the preliminary practice, and in order to enable teachers to form some notion of the advantages of marking with a scale, they were first asked to rate each practice specimen on a scale of 100. After recording these ratings they were asked to rate each specimen in terms of the scale. To convert the latter to a per cent basis the scale ratings were multiplied by 10. When all had completed their ratings the correct or standard value for each specimen was made known. The number of points which each specimen was rated too high or too low, both with and without the scale, was then recorded. In every case it was found that the group of teachers as a whole rated more accurately with the scale than without. This was not always true of every teacher nor of every specimen. In most schools improvement resulting from the use of the scale was shown by a decrease in variation from the correct values of from one-third to one-half of that when judging without the scale. A detailed account of the preliminary experiment in one of the schools tested will be found in the issue of *School and Society* for February 2, 1918.

In this school fifteen teachers were asked to rate twelve specimens. It was found that when estimating on a scale of 100 they were not only far from the correct value, but they rated almost invariably too high. Mediocre specimens were given a good mark. On the other hand some very good specimens were rated too low, because the teachers failed to appreciate their real merits. If the practice of rating mediocre specimens too high is general in everyday work, and there is good reason for believing that it is, teachers are undoubtedly not getting the best out of their pupils. Instead of stimulating pupils to the highest quality of thinking they are capable of, the teachers are too readily satisfied with mediocre efforts. The occasional use of a scale to measure the quality of children's compositions should do much to stimulate better work in composition.

When asked to grade specimens for their general merit on a scale of 100, the teachers, as teachers in most schools, complained

that they must know the grade to which a given specimen belonged. This is due to the fact that teachers use one arbitrary standard in one grade and another in the next. If they are asked to tell what a mark of 80% on a seventh grade paper should be if that paper were produced in the sixth, they are utterly at sea. The fact that these teachers estimated poor specimens unduly high and that they underestimated some of the very best, seems to be good evidence that teachers ordinarily mark on the basis of their general impressions. When they are asked to rate a composition with a scale, and to make general merit the basis of their rating, they are not adopting a basis which is essentially new or different.

These 15 teachers were on the average 19.1 points away from the correct or standard value for each specimen when judging upon a 100 per cent basis. When they used the Trabue scale to aid them in their rating they averaged 11.6 points from the standard value. Thus they improved their judgments by an average of 7.5 points or 39.1% for each specimen, in their first efforts at using a scale. With continued use they could doubtless improve their ratings still more. Experiments in judging handwriting indicate that improvement in accuracy of rating with a scale continues over a considerable period of practice. (See Gray, *Journal of Educational Psychology*, Feb. 1915). If improvement continues in judging such a simple function as handwriting, there is no reason to believe that it would not continue to improve in a complex function like composition. The writer found in a single experiment with fifteen judges that improvement in rating composition continued to show in each of the four successive practice periods.

Not only did the judgment of these teachers as a whole improve when aided by a scale, but the judgment of every teacher, except one, improved on one-half or more of the specimens. This one teacher was the best of the twelve judges without the scale. Yet she improved on four of the twelve specimens. She rated six the same in both cases. On two she did not judge as accurately. Out of 180 individual ratings required (i. e. 15 teachers judging 12 specimens) 125 or 69.4% showed a gain, 20 remained the same and 35 were not as good when using the scale. The results of this experiment indicate the increase in accuracy of judging compositions to be gained from the use of a scale.

The Median Scores. What is the quality of the compositions which Wisconsin children write? The median scores for each city by grades together with the date of the test and the sections tested are shown in Table 42. The median for all children tested, together with Trabue's proposed standards are given at the foot of the table. The schools have been arranged in approximate order of the portion of the work of the grade which the children had on the average completed.

TABLE 42.—Median Scores in Composition by Cities¹

Cities	Date tested	Section tested	III	IV	V	VI	VII	VIII	IX	X	XI	No. of children tested
1	9/28/16	B	.....	.....	.....	3.9	4.9	.....	.....	.....	.....	79
2	10/ 3/16	B	2.4	4.0	4.4	4.9	5.6	5.0	.....	.....	.....	530
3	10/ 9/16	B	.....	2.7	3.0	3.7	4.2	4.3	.....	.....	.....	331
4	10/23/16	B	.....	2.9	3.7	4.2	4.6	5.3	4.8	5.7	6.7	467
5	11/27/16	B	.....	3.2	4.3	4.7	5.0	.....	.....	.....	.....	344
6	12/ 5/16	B	1.9	2.3	2.4	4.2	4.4	4.4	.....	.....	.....	315
7	12/12/16	B	.....	1.6	2.6	2.7	3.7	4.7	.....	.....	.....	331
8	1/ 9/17	B	2.6	2.5	3.9	4.2	5.4	4.9	.....	.....	.....	353
9	1/ /17	A&B	2.6	2.8	3.3	3.8	4.0	4.2	.....	.....	.....	1,209
10	3/24/17	A&B	1.7	2.4	2.8	3.7	3.8	4.3	5.9	6.9	.....	1,208
11	3/ 8/17	A	.....	2.9	3.7	4.4	4.2	.....	.....	.....	.....	84
12	4/10/17	A	2.0	2.1	3.9	4.2	4.1	4.5	.....	.....	.....	186
13	4/12/17	A	1.7	3.0	3.5	4.2	3.8	4.3	4.9	5.0	5.4	169
14	6/ 4/17	A&B	1.7A	2.9	3.6B	.....	5.3B	5.4B	.....	.....	.....	123
15	6/ 6/17	A&B	.....	3.2	.....	4.8A	4.5A	5.6A	.....	.....	.....	114
Total.....			.....	.....	.....	4.6	4.6	.....	.....	.....	.....	5,848
Combined Median ..	.....		2.0	2.7	3.4	4.0	4.3	4.6	5.8	6.6	6.4	.....
Trabue's Standard..	.....		.....	3.5	4.0	4.5	5.0	5.5	6.0	6.5	6.9	.....

¹ Those desiring to make comparisons with schools outside of Wisconsin may do so by referring to page 287 of "An Educational Survey of Janesville, Wisconsin."

The children as a whole in these Wisconsin cities do not make a commendable showing. There is, however, a considerable difference between the scores of different cities. The median for all eighth grades is only 4.6 which means the average eighth grade pupils did not write a composition as good as sample 5 on the Trabue Scale. Median sixth grade children did little better than the sample of the scale valued at 3.8. The median of 2 for the third grade is just above Trabue's sample 1.9. The progress from median third grade performance to median eighth grade performance is less than three steps on the Trabue scale. This is certainly inadequate improvement for five additional years of effort. In the best schools the median score was an entire step and sometimes as much as two steps higher on the scale. Why this difference, or why some schools should do much

better than others is somewhat difficult to understand. In some cases the scores may have been somewhat lenient, but the principal cause is a difference in teaching. Composition is better taught in some schools than in others. A single illustration will make this clearer.

City No. 4 made a good showing in the elementary grades, particularly when the date of the test is considered. This school gives much attention to oral composition. The socialized recitation, in which pupils are encouraged to express themselves freely, is in use in this school. These two facts have resulted in shifting the major emphasis in language teaching from mechanics to thought work. The children in this school, more so than in some others, are primarily concerned with what they have to say. They are concerned with saying something worth while first of all. The mechanics, the cast, or framework, for what they say is secondary. This does not mean that they do not acquire a knowledge of the necessary mechanics of good composition equal to that of other children, but they do it as a result of a felt need for clothing what they have to say. A few selected papers from the test in this school follow:

By a Fourth grade girl—age 10. Rated as 3.8

Next Saturday I would like to go to Appleton and play with my cousins.

I would go with my mother, father, and sister.

I would go at 10 a clock in the morning so I would have lots of time to play or do anything that came along.

I would go and have a ice-cream with my cousins in the afternoon. When I came home I would spend the rest of the afternoon playing or doing something like that.

Then I would eat supper and after supper go home on the street-car at about 8 a clock.

When I came home I would go to bed.

By an Eighth grade boy—age 12. Rated as 6

Saturday is the only vacation day of the whole school term excepting holidays of which there are very few. I should like to go rabbit hunting next Saturday out to some farm. It is just the rabbit season now and a fellow's fingers are twitching for the want of shooting a rabbit. Besides hunting there is pleasure in roaming around in the woods or plying about a marsh or swamp in a boat. There are many other things to shoot such as squirrels, partridges, and ducks. I would like to know of any fellow who would not like to do this next Saturday.

By a Tenth grade boy—age 16. Rated as 7.2

I would like to spend next Saturday along the lake shore hunting ducks. Hunting is one of the finest sports there is and as the duck season is now open and the ducks seem quite plentiful, nothing appeals

to me more than a days shooting. The very thought is invigorating. Anyone who has ever hunted knows what the attraction is. There are no words to explain how you feel when sitting behind a "blind" watching a flock of ducks come sweeping, pass, circle, and then land among the decoys with a splash. Then the sport comes, when you rise up and pump shell after shell into the flock and then go out in the skiff and gather in your game. To hunt is the instinct of man which he inherited from his primeval forefathers. And through all the ages in which man has become slowly civilized that instinct has still remained, even though greatly moderated.

The medians in schools which made high scores should serve as a tentative goal which others may hope to attain with improved teaching. Certainly a school in which language work is well taught should reach Trabue's standard. While it is an ideal rather than an actual standard, it appears to be neither impossible of attainment nor too exacting. That this standard is not too exacting may be judged by referring to the scale specimens. In fact it is lower than the best fourth of the pupils in several of our grades are already doing. This may be seen by reference to the figures for the upper 25 percentile in Table 43. Surely it is not asking too much that seventh grade children write a composition as good as quality five, or that pupils in the ninth grade of the high school write as well as quality six. That the standards set by Trabue from grade four on are not impossible of attainment, is shown by the fact that some schools in every elementary grade did even better.

The Variation Within Grades—Do All Children of a Grade do Equally Well? The number of pupils in each grade whose papers were rated at each of the different steps may be seen from Table 43. The median and the lower and upper 25 percentile scores are shown at the foot of the tables. One-half in each grade did better than the median and the other half did not do as well. Three-fourths of the pupils in each grade did better than the lower 25 percentile and one-fourth did better than the upper 25 percentile. There is a very decided difference between the composition attainments of the best and poorest in every grade. The range of third grade scores extends more than half the length of the scale. One-half of the children however were between 1.3 and 2.8. In the sixth and seventh grade the range extends almost over the entire scale. This means that compositions produced by children in these grades range from the very poorest to almost the very best that we may expect.

TABLE 43.—*Distribution of Composition Scores According to Quality For 15 Cities*

Value of specimen ¹	III	IV	V	VI	VII	VIII	IX	X	XI	No. of children tested
0	59	34	20	6	1	4	.....	.....	.....	124
1.83	216	314	139	62	34	12	1	.....	.....	778
2.60	140	389	283	197	121	84	3	1	.....	1,218
3.69	50	254	318	356	261	212	24	7	3	1,485
4.74	12	80	172	292	226	204	55	25	1	1,067
5.85	1	42	72	107	126	159	87	35	17	646
6.75	.....	10	21	61	71	85	65	52	16	381
7.72	.....	3	1	18	21	23	22	31	7	126
8.33	.....	.....	.....	4	2	.....	.....	16	1	23
Total	478	1,126	1,026	1,103	863	783	257	107	45	5,848
Lower 25 percentile.....	1.3	1.9	2.5	3.2	3.4	3.6	4.9	5.6	.....	.....
Median	2.0	2.7	3.4	4.0	4.3	4.6	5.8	6.6	6.4	.....
Upper 25 percentile.....	2.8	3.6	4.3	5.0	5.3	5.7	6.6	7.4	.....	.....

¹ The results have been entered in terms of the steps on the original Hillegas scale. The results for the few schools reported in terms of the Trabue scale have been distributed according to the nearest Hillegas scale step to which each pupil's score corresponded. Thus specimens rated 3.8 on the Trabue scale appear opposite 3.69 in the table.

The lamentable thing about it all is that these very poor and very good composition writers are too often in the same grade, and often in the same class with no provision being made to fit the teaching to their varying needs. Some children have been promoted to the fifth, sixth, seventh, and eighth grades who are in no sense capable of doing the quality of language work that should be expected in these grades. Evidently the ability to write an average composition does not play the part that it should in determining fitness for promotion in some schools. Many of these children could derive greater benefits from the study of composition if placed in grades or classes where the work is nearer their level of comprehension.

The upper 5% of the fourth grade pupils who already do as well as median eighth graders, or the upper quarter who now exceed the lower quarter of the seventh grade, will never be urged to the limit of their capacities unless they are given a different type of work, or are advanced more rapidly than others in the grade. Unless their ability is recognized they are apt to improve but little during the remaining years. Unless teachers can appeal to their imagination or can tax their real thought powers, they may become indifferent toward language work and even grow to dislike school. This will be particularly true if teach-

ers insist upon drilling all of the class upon rules of formal grammar. What we have said of the fourth grade applies equally well to other grades. These brighter children in each grade should be permitted to advance more rapidly. Work should be given them that is more nearly within their capacity. Wherever possible the brighter children should be grouped together for language work, even though it be only a small group within a given grade or class.

Similarly children of less capacity should be grouped together. Their deficiencies may be due to unfavorable language conditions in the home, to inferior mental endowments, or to poor previous school training. But whatever the cause, the fact of their lack of development should be recognized. They should not be thrown in "helter-skelter" with others who are unusually accomplished to succeed or flounder as best they may. They should be grouped with others who *for the time being* are approximately their equals.

When children are grouped as we have indicated, teachers can more nearly adapt the work of the course to individual needs. The lockstep method of teaching all pupils in a class as though they were of the same level of attainment and thinking ability needs to be broken down in language teaching even more so than in other subjects. Slavish adherence to the "equality" method of treatment perhaps more than any other cause is responsible for the poor showing in many schools. It accounts for the unusual degree of overlapping of abilities, i. e. where large numbers of children in lower grades excelled no small proportion of the children in several grades above. This is revealed in Table 43.

The Kind of Work Which Teachers Demand—What Qualities do teachers value in children's compositions? Another factor only slightly less responsible for poor results in language, is the formal type of excellence which teachers expect, and with which they are satisfied. So long as teachers prize minor qualities to the neglect of the more valuable attributes of good composition they will fail to develop the best in children. Mechanical perfection is too frequently the aim, both in the elementary grades and in the high school. Content receives secondary consideration. Just as overemphasis upon formal grammar fails to develop children who will habitually use correct form in written

and spoken English, so too overemphasis upon the mechanical phases of composition fails to develop children who can produce oral or written compositions of genuine merit. Too rarely does it develop in a child a desire to express himself. All too often composition writing becomes a drudgery, and not a privilege.

Almost without exception the teachers in schools tested, when asked to list the qualities which they prize in composition, mention mechanical qualities first. Among these they give:

Spelling	Paragraphing	Use of capitals
Punctuation	Grammar	Sentence structure

Apparently they would exercise little better judgment in grading a paper than does the college professor who marks a paper "failed" if it contains three misspelled words, regardless of the ideas it expresses. Too many teachers, it is feared, have been influenced by the type of college instructor who fails a theme for what is commonly known as a "comma" fault, serious though it may be mechanically. It was usually only after some discussion that thought qualities, such as the following, were brought out:

Unity	Maturity of thought	Emphasis
Coherence	Life	Vividness
Originality	Imagination	Color
Choice of words	Visualization	Figurative language

Many of the mechanical features are such as would pass unnoticed in oral composition, and therein lies one advantage to be gained from oral language work. Mechanical features are less apt to be placed in the foreground. Thought qualities have a greater possibility of being stimulated. Insufficient attention to oral composition is then another cause, which helps to account for the unsatisfactory attainments of children in composition.

But even though gain will be made by a greater stress upon oral language, the best results can never be expected until teachers aim consciously and definitely at the development of the thought side. They must lead their pupils first of all to think, to observe, to have ideas, to reflect upon their experiences, and to tell them. Teachers must concern themselves above all with what children have to say, and only secondarily with the way in

which it is said. Under this system, form will not be neglected but ability to use it will be acquired because the child feels a need for saying what he has to say in the most effective way.

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CHAPTER V

READING

For the year 1916-17 systematic attempts to measure success in reading achievements were confined to silent reading. Other phases of reading work such as rates of silent and oral reading, expression in oral reading, and ability to read orally without error, all of which are important for certain purposes, and nearly all of which receive distinct emphasis in the elementary grades, might be tested. Those who are especially interested in testing these phases of reading are referred to the works of Gray. Among these are his monograph, "Studies in Elementary School Reading", and his reports on reading in connection with the St. Louis and Grand Rapids surveys.

While it would have been desirable oftentimes to have secured data on each of the various phases of reading ability, it was decided not to recommend tests requiring a large amount of labor, or which required scorers to exercise considerable judgment in marking papers. To those who desired to measure results in reading it was suggested that success in thought reading be tested first, on account of its overshadowing importance.

Progress in and out of school depends largely upon ability to interpret the printed page. While the first few years of a child's reading efforts are devoted largely to a mastery of mechanics it is for the purpose of enabling him later to understand the language of books and to derive information from history, geography, science and literature. The child who is unable to grasp clearly the thought of the problem in arithmetic, or the events recorded in his history text, has little hope of success in these subjects. It is of small concern to his successful advance whether his oral reading is fluent and devoid of mechanical errors.

If a child is to go through school and out into life as a clear thinking progressive citizen, he must be trained not only to read,

but to relish reading for the information it gives him and for the growth of ideas that it stimulates. No other mission which the school has is more important than such training. Nothing is of more consequence to a nation than a body of growing thinkers. Its citizens must be trained to read what its thinkers are writing, and to exercise judgment as to the worth of what is read. The small proportion of our citizens who read the kind of material which stimulates intelligent thinking, can be charged largely to the failure of the schools in the past to develop the right kind of reading habits. It was for reasons such as these, that tests which measure ability to grasp the thought of the printed page were favored when recommendations were made to those desiring reading tests.

In suggesting reading tests to be used during the year 1916-17, the writer more often proposed the Kansas Silent Reading Test than any other. The test not only measures success in rapid thought reading but is easily administered and scored. The latter consideration was especially important in view of the fact that few teachers and superintendents in Wisconsin had had previous experience in giving standard tests. While criticism might be offered against certain of the paragraphs on the test, the simplicity and definiteness of the instructions for giving the test, scoring the papers, and tabulating the results seemed to outweigh any objections that might be raised.

The Kansas Silent Reading Test, the nature of which may be judged from the selected paragraphs shown on the page following, combines the elements of thought and speed. It contains a greater number of such paragraphs than can be answered by any pupil in the time given, five minutes. The paragraphs vary from those that are very easy to those that are quite difficult. A definite value is attached to each and a pupil's score represents the sum of the values attached to paragraphs correctly interpreted. There are three tests in the series, Test I for grades three, four and five, Test II for grades six, seven and eight, and Test III for high school grades.

Eighteen cities reported their results on the test in the elementary grades. Two of them included the scores made by high school students. The test in 15 of these cities was given by the writer. In most instances, however, he was assisted by the superintendent or some person designated by him. In each case

No. 8.

Here are two squares. Draw a line from the upper left-hand corner of the small square to the lower right-hand corner of the large square.



Value
2.6

No. 9.

A farmer puts one-half the hay from his field into the first stack, then two-thirds of what is left into a second stack, and the remainder in a third stack. Which stack is the largest?

Value
3.0

No. 10.

Below are two squares and a circle. If the circle is the largest of the three, put a cross in it. If one square is smaller than the circle, put a cross in the large square. If both squares are smaller than the circle, put a cross in the small square.



Value
3.9

No. 11.

"The curfew tolls the knell of parting day,
The lowing herds wind slowly o'er the lea,
The ploughman homeward plods his weary way,
And leaves the world to darkness and to me."—(Gray)

Study the above quotation carefully. The author lets us know his feeling about the coming of night. If you think his feeling is one of fear and dread, underscore curfew. If his feeling is one of peace and gladness, underscore ploughman.

Value
4.0

No. 12.

Read these carefully:

Bears are larger than bugs.
Houses are larger than bears.
Mountains are larger than houses.
Then bugs are not as large as mountains.

Value
4.0

I have tried to make no false statement among these four. If I have succeeded, underline the word success. If I have failed, underline the word failure.

success

failure

the person assisting, first observed the writer give the test, and was instructed by him before attempting to give the test himself. The principal requirement necessitating caution was that of accurate timing. In the three schools in which the tests were not given under the immediate direction of the writer, the persons in charge were experienced in giving standard tests.

The Median Scores by Cities

How well do Wisconsin children read? The median scores, the date of the test and the sections tested for each city are indicated in Table 44. "B" sections in schools tested during the first semester, or "A" sections in those tested during the second refer to schools having only annual promotions.

TABLE 44.—Median Scores For Kansas Silent Reading Test By Cities

Cities	Date of test	Section tested	Test I			Test II			Test III				No. tested
			III	IV	V	VI	VII	VIII	IX	X	XI	XII	
1	9/28/16	B	.....	.....	14.6	17.8	.....	.....	17.6	30.5	23.2	.....	132
2	10/ 3/16	B	1.2	4.4	12.1	12.0	14.2	16.3	.....	.....	.....	.....	552
3	10/10/16	B	1.7	5.1	15.3	11.1	17.8	20.2	.....	.....	.....	.....	431
4	2/12/17	A&B	3.3	5.3	12.0	13.8	15.3	18.9	.....	.....	.....	.....	494
5	11/ 2/16	B	5.7	6.9	13.3	11.9	16.7	20.4	.....	.....	.....	.....	719
6	11/ 9/16	B	3.4	7.0	12.8	12.8	15.2	28.1	.....	.....	.....	.....	476
7	11/27/16	B	2.3	10.7	13.5	14.6	19.2	16.2	.....	.....	.....	.....	422
8	12/ 7/16	B	14.0	9.3	13.1	14.4	15.9	17.4	.....	.....	.....	.....	316
9	12/12/16	B	.....	.....	.....	10.7	12.2	16.5	.....	.....	.....	.....	96
10	1/10/17	B	5.3	11.0	17.5	19.0	18.0	19.6	.....	.....	.....	.....	358
11	1/ 2/17	B	11.9	17.4	14.8	14.5	19.2	21.3	.....	.....	.....	.....	152
12	3/24/17	A&B	4.9	9.2	12.1	14.7	16.5	20.1	22.4	24.4	27.6	26.4	1,390
13	3/ 6/17	A	5.3	10.0	14.7	14.6	21.6	17.7	.....	.....	.....	.....	517
14	3/ 8/17	A	4.5	11.2	14.7	15.3	16.0	13.0	.....	.....	.....	.....	128
15	5/10/17	A	2.1	6.3	10.6	.....	15.9	16.3	.....	.....	.....	.....	303
16	1/ /17	A&B	6.0	11.8	16.9	20.0	20.1	30.8	.....	.....	.....	.....	760
17	4/10/17	A	6.3	11.3	15.0	10.8	17.0	19.8	.....	.....	.....	.....	228
18	4/12/17	A	0.8	8.5	12.0	13.5	16.5	20.3	.....	.....	.....	.....	75
Median .....	.....	.....	4.3	8.6	13.6	14.1	17.1	19.8	.....	.....	.....	.....	7,549
Standard .....	.....	.....	5.3	9.5	13.2	13.9	16.2	19.2	.....	.....	.....	.....	.....

The cities are arranged in the approximate order of the portion of the work of the grade which the children had on the average completed at the time of the test. Thus, pupils in the first city of the table had completed less than one-ninth of the work of the grade, while those in the eighteenth had completed approximately eight-ninths of the grade. Children in cities near the foot of the table should score much higher than those in cities near the top.

An examination of the table reveals the fact that as far as these schools are representative, Wisconsin children are below

the standard in the third and fourth grades. This is in line with conclusions drawn from reading exercises witnessed in these grades. Few teachers give sufficient attention to training young children to get rapidly and accurately the thought of what they read. In the remaining elementary grades Wisconsin children read better than the standard set by 100,000 children in other states.

The table reveals further that different schools attain different degrees of success in the teaching of reading. With the possible exception of the scores for the third and fourth grades of schools tested early in the school year, the median scores bear little relation to the work of the grade which the children had completed. Some of the very lowest scores were made late in the year.

Since Test I was identical in grades three, four and five, comparisons may be made between these grades. Similarly grades six, seven and eight in which Test II was used may be compared. Some fifth grade classes did not do as well as others of the fourth. Likewise, some fourth grade classes made a lower median score than some third classes, and some even lower than the standard of the third grade. The poorest eighth grade class scored lower than the standard for grade six. The best eighth grade classes scored more than double that of the poorest. The best sixth grade score is nearly double that of the poorest. Such conditions are unwarranted and cannot be accounted for on any other ground than that some schools accomplish much less than they are capable of. When sixth grade classes in some schools can read as well as eighth grade classes in others, as happens, eighth grade teachers should be asked to explain why their children have attained no greater proficiency. On the other hand successful teachers in the sixth grade, and elsewhere, should be asked to explain the secrets of their success in teaching reading. Demonstrations should be arranged which other teachers may be permitted to see and to discuss. Better teaching, closer supervision of the methods employed, and more careful examination of successful methods of teaching reading, as well as an abundance of suitable reading material will be necessary in many schools before the limit of the possibilities in reading development can be even approached.

The scores shown for school 11 and for the third grade of school 8 deserve mention. For the latter the writer verified the results by examining the paper of each child in the single class represented. These children are unusually capable and will bear watching throughout their school course. School 11 made a good showing not only in the third grade but in others. It is a good illustration of successful results attained through a conscious effort to develop good reading. The interest of the superintendent in this city led him to measure the achievements of the pupils in other standard reading tests. For this purpose the Starch and the Thorndike reading tests were employed. It is significant that the children again far exceeded the standards set. Undoubtedly, the children in this school are good readers.

Two phases of the method of teaching reading in this school account in a measure for its success. One of these is the grouping of the children. Pupils of a given grade are divided for the purposes of the reading recitation into several small groups. Each group reads material suited to the abilities of the children in it. As many reading texts may be in use at a given moment as there are groups. Children of a group commonly read to the other members of their own group while the teacher passes from one group to the next. This not only gives a pupil an opportunity to read material suited to his own ability to comprehend, but it gives him much more frequent opportunity to read than under ordinary classroom methods. He spends less time in hearing some one else read what is no longer of interest to him. The other phase of the reading method in this school which accounts for the unusual ability of the children is the large amount of reading that is done in the course of a school year. As a result, in part at least, of the frequent opportunity that children have to read under the grouping system, they read much more than the average number of books. *They learn to read by reading.*

Certainly the success attained in the school to which we have just referred should commend the method for trial in other school systems. The writer's observation leads him to believe that the mediocre results obtained in several of the schools is to be accounted for in part by the niggardly policy adopted by school boards toward the purchase of sufficient reading material. In some schools the children read only one-half or one-third as

many books as in others. When superintendents are asked to account for it, their usual reply is, that the board has been unwilling to purchase additional material, and that teachers do not feel warranted in asking pupils to purchase books which they will use but a few short weeks. Such an undemocratic policy on the part of boards of education cannot be too severely condemned.

A policy since adopted to meet this situation in one of these schools is worthy of note. On the strength of recommendations made, the board purchased a number of sets of supplementary readers but not in sufficient quantity to provide all buildings with a set of each. Provision is made for systematic exchange of sets between buildings. On a certain day of each week, known as "book exchange" day, sets that have been completed are forwarded to the superintendent's office which acts as a clearing house. These sets are apportioned to different buildings by the supervisor of grades. At the close of the afternoon session, messenger boys from these schools come for the books which are thus available for use on the following day. While this system is especially adapted to use in large school systems, it can be employed to a limited extent by small schools in neighboring villages. At the comparatively small additional cost of transportation, two small schools could under a cooperative arrangement double the number of books available.

The Distribution of Scores

How well does the reading of some children in a grade compare with that of others? Table 45 serves to indicate the variations in reading achievement for the children in each grade. Comparatively few teachers would admit offhand that such marked variations are possible within a grade. Yet the table confronts us with the facts. A few of the very low scores, particularly in the third grade, may be due to failure to understand what was wanted. But no such explanation can account for the fact that the best third grade readers attained a score four times that of the standard median for their grade. In each of the other grades there are children whose score was nearly three times that of the standard median for their grade. A considerable proportion of each grade failed to attain a score half as large as the expected standard. Moreover, an unusual

proportion in each elementary grade did better than many children in grades above. More than one-fifth of the children in the third grade read better than the poorer half of the fourth grade. Similarly, nearly one-fifth of the fourth grade surpassed the poorer half of the fifth grade. More than a third of the sixth grade excelled the lower half of the seventh and a third of the seventh grade pupils read better than median eighth grade chil-

TABLE 45.—*Distribution of Scores in Kansas Silent Reading Test For 17 Cities*

Score	Test I			Test II			Test III			
	III	IV	V	VI	VII	VIII	IX	X	XI	XII
0-.9.....	193	46	5	2	4	.....	2	.....	.....	.....
1-1.9.....	163	42	11	2	1	.....	.....	.....	.....	.....
2-2.9.....	139	61	13	5	3	2	1	.....	.....	.....
3-3.9.....	84	54	14	13	8	6	1	1	1	.....
4-4.9.....	126	71	31	18	5	7	.....	1	.....	.....
5-6.9.....	183	176	69	46	41	15	5	1	1	.....
7-8.9.....	125	187	113	115	67	37	5	2	.....	.....
9-10.9.....	82	158	148	121	90	44	11	2	2	1
11-12.9.....	56	144	174	126	114	67	17	5	6	.....
13-14.9.....	45	122	218	115	110	85	14	5	5	3
15-17.9.....	29	73	201	145	182	161	37	23	11	5
18-20.9.....	12	47	169	144	156	164	31	17	8	10
21-23.9.....	4	17	87	71	127	163	25	14	11	3
24-26.9.....	1	4	21	44	89	96	34	18	16	14
27-29.9.....	.....	4	12	24	55	55	19	10	14	6
30-34.9.....	.....	2	10	31	69	93	31	31	21	13
35-39.9.....	.....	.....	4	2	11	34	10	7	4	3
40-44.9.....	.....	.....	.....	2	2	5	8	6	12	5
45-49.9.....	.....	.....	.....	.....	1	4	.....	2	2	.....
50-59.9.....	.....	.....	.....	.....	2	2	.....	3	5	2
60-69.9.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....
70-79.9.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Above 80.....	.....	.....	.....	.....	.....	.....	2	1	1	1
Total.....	1,242	1,208	1,305	1,026	1,137	1,040	254	150	121	66
Median.....	4.3	8.6	13.6	14.1	17.1	19.8	21.4	24.7	26.9	26.4
Standard Median.....	5.3	9.5	13.2	13.9	16.2	19.2	22.7	24.7	26.1	28.3

dren. Were these children who exceed the median of the grade above to be grouped with the upper half of the higher grade for purposes of reading, in every school, there is good reason to believe that better reading results would be obtained than under present conditions. This has been attempted in one school system to the writers knowledge with satisfactory results.

It would seem either that ability to read plays little part in determining promotion, or that teachers differ widely in the degree of reading development required for promotion. Both factors very likely help to account for the extreme variations in the reading ability of pupils nominally in the same grade.

Many too, fail to recognize the true abilities of their pupils. This may be illustrated from an inquiry made by the writer regarding one of the two eighth grade pupils whose score on the test fell between 50 and 59.9. The teacher when asked how she accounted for the unusual score of this boy, replied that he was not a bright boy at all. But upon further questioning she admitted that he was a strong pupil in all work requiring thought. He was not fluent in oral reading and was afflicted somewhat with "bashfulness". She had formed her estimate upon surface qualities alone. No doubt many teachers have revised their opinions of a number of their pupils as a result of the test. The use of various standard tests is recommended for that purpose.

Regardless of whether or not teachers have judged the ability of their pupils accurately, or have promoted wisely, the condition of wide differences in reading ability among these pupils is an actual and present fact, which needs to be taken into account in planning work for them. The condition which Table 45 reveals is particularly serious as it applies to the eighth grade. These children are about to enter high school very unequally prepared to undertake the study of English and other secondary school subjects. Definite training in reading in the high school for some, will be perhaps the most economical means of meeting this situation, and is therefore recommended. Some of the individual differences, shown by Table 45, have resulted from the teaching, others from inequalities in the native endowments of the children. Teachers must be brought to see that equal efforts on their part, or on the part of pupils often produce very unequal results. Some of these children have had the advantage of better teaching, but others have probably acquired greater facility in reading with no greater effort, simply because they were more richly endowed by nature. In order that no mistakes may be made in estimating the ability of the individuals in a class as the result of a single test, other standard reading tests should be applied. A composite result of several tests will afford a much more satisfactory diagnosis of individual ability in reading than a single test. When a satisfactory diagnosis of the reading abilities of each child has been made his work should be planned accordingly. Children of somewhere near equal attainments or interests may be grouped together temporarily. These groups may be flexible and readily changed.

Not all children in the class need be required to read the same material, or need be expected to progress at the same rate.

What elements in the teaching of reading, or in the reading needs of children, contribute to differences in their reading acquirements?

Good readers will be found to differ from poor readers in knowledge of the mechanics of reading. As a result of insufficient familiarity with the mechanics, the poor reader spends much of his time in puzzling out the pronunciation of words. This serves to distract him from the thought of what he reads. The good reader proceeds uninterrupted and is able to retain what he reads as an organized whole, and to reflect upon it.

The poor reader is often handicapped by a lack of knowledge of the meanings of words. Until he understands their meaning he has little hope of getting the thought of what he reads. Hence arises the need for selecting different reading materials for each of the different groups of the class. All need not read the same stories or even the same books. Poor readers should be given material within the range of their comprehension, introducing only a few words at a time that are new to them. It is poor economy to select material so difficult that only the brightest can enjoy it.

Pupils differ in their ability to grasp the thought of what they read. Gray in his study of reading in the St. Louis schools found that even though pupils might be equally proficient in their mastery of mechanics they might differ materially in their ability to master the thought. Some can apparently reflect upon the story as a whole while others can deal only with very small parts of it. Their ability to organize their ideas as to the worth of what they have read differs. Wide differences will be found in the amounts which they can remember of what is read.

A marked difference will be found in the rates of their oral and silent reading. This fact undoubtedly accounts in part for the wide variations in reading scores shown in Table II. Some pupils acquire habits of slow reading early in their school course and remain slow readers often for life. Gray in his study of reading in the St. Louis schools found that in some classes the rate of oral reading for the most rapid readers was more than four times as great as that of the slowest. The writer has found

that the most rapid readers in a class seldom read less than three times as much as the slowest in the same time.

Finally differences in interests should be taken into account. Interesting material is a prerequisite to all good reading. The type of story that is most appealing to boys in intermediate and grammar grades is often quite different from that which appeals to girls. This is a matter of common knowledge among librarians in children's departments of our public libraries. To be of most service, reading material for children reared in foreign language homes should involve experiences which they can appreciate.

Factors in teaching which account for differences in the results obtained are several. Among the most important of these is the attention given to preparation. Too many teachers make little preparation for the day's lesson. They trust largely to their memory for the story of the lesson, instead of preparing a number of motivating questions which will require pupils to do reflective thinking about today's lesson or that will help them to prepare tomorrow's lesson. Too frequently their questions are of the trivial, "who was John?" sort. They are such as occur to them at the moment and lack any deep seated purpose. The teacher who asked her children how they would paint the story in today's lesson, or how they would dramatize it, broached questions that required her pupils to do reflective thinking. Such questions not only supply pupils with a motive but require them to organize, to weigh values, to exercise judgment, to select essentials from nonessentials, and provide them with opportunity for the exercise of initiative.

A second important factor is the teachers familiarity with the field of reading material. Too often teachers are unacquainted with the best available material for children. Rarely do they have anything like an adequate acquaintance with the literature best adapted to children of various interests.

Another important factor sometimes resulting in a handicap to children is the teacher's lack of facility in teaching the mechanics of reading. She is unable to give pupils the help required to master new situations. Poor readers frequently are permitted to spend undue time in pondering over the pronunciation of a word. The result is that less time is left for reading. Pupils can often be made more independent by the acquisition

of a few simple rules or by being taught to look for parts of a word that are familiar.

The aims in primary reading established by a school are a matter for serious consideration. Many teachers, particularly those enamored by certain well advertised schemes of teaching primary reading, insist that the sole purpose is to develop ability to use the mechanics of reading. Others wisely train children to get the thought of the story from the beginning, as well as to master the mechanics. Gray after his study of the reading achievements of the children in Cleveland, Grand Rapids and St. Louis concludes: "It is evident that of two schools, the one which masters the mechanics as it is developing in its power to interpret the printed page will rank superior in general reading ability to the school which masters mechanics alone."¹

If good reading is desired it is important that pupils spend the reading period in reading. Easy reading is much to be preferred to material that makes the recitation a word stumbling exercise. Pupils should read material because it appeals to their imagination, because it is entertaining, or because it gives them useful information, and not for practice in mere word calling. In one of the schools tested the writer observed a third grade reading exercise in which most of the children spent more time in waiting to be told the pronunciation of words than in actual reading. Approximately one-third of the recitation period had been spent in acquiring the pronunciation of difficult words. This was followed by oral reading. The first boy called upon hesitated on the third word encountered. The class pronounced it for him. He hesitated again after reading three words farther. He continued thus until he had finished two or three lines. A second pupil did much the same. A third read a paragraph fluently without error. A fourth and a fifth read much as the first two. Another was able to read a paragraph without help. Here the lesson closed without a comment having been made by the teacher or pupils. Four additional pages were assigned for the next day's lesson. The story, that of "The Meadow Mouse," would have been interesting to children more advanced than these. As it was, very little practice in reading was being

¹ Gray: Chapter on Reading in the Survey of the St. Louis Public Schools,

given, and that of a kind not designed to make thoughtful readers.

Much of the material which children are called upon to read lacks vitalizing interest. It is of a kind not intended to result in reflective thinking. Teachers often need to exercise choice. Reading texts need not be followed slavishly. Unappealing stories need to be omitted or made appealing by the teacher's enlargement upon them. Unusually good stories, not in the readers in use, may often be mimeographed or written upon the board.

Few teachers seem to realize that a reading recitation can be conducted in any other way than as an oral exercise in which each pupil reads a few lines in turn. More practice in both oral and silent reading is needed. In the ordinary class a pupil has opportunity to read once during the recitation period. If he is one out of a class of twenty, he is occupied about one-twentieth of the time of the reading period in oral reading practice. What more glaring illustration of inefficiency could be found than this? Such procedure not only affords negligible practice in oral reading but it requires a pupil to listen to the *re*-reading of material no longer of interest to him. In addition it deprives him of valuable time that could otherwise be spent in silent reading. Sectioning the class into small groups is one means of securing for the pupils more practice in oral reading. Another method is that of allowing a pupil who has a new and well prepared story to read it to the class. The child who reads to his class in this manner has a motive for developing good expression and his classmates have a motive for listening. Some class periods should be spent in silent reading. To center attention upon the thought of what is read the teacher may at times prepare well directed questions to accompany the exercise.

Facility in rapid thought getting can be increased by the frequent use of practice exercises. The teacher may assign a new selection, or mimeographed copies of selected paragraphs may be distributed. At the end of one minute, or some other definite period, pupils may be asked to write answers to questions which the teacher has prepared, or they may be asked to reproduce what they can remember. The results should be made the basis for a study of individual needs.

Emphasis upon rapid reading, particularly in the lower grades should be insisted upon by supervisors. Many of the low scores that were made in the test are undoubtedly due to the fact that pupils have been permitted from the beginning to choose their own rate. As the result the habit of slow reading has become strongly fixed.

Finally the need of definite standards in reading attainments should be mentioned. Many teachers fail to develop good readers because they are unaware of the fact that their pupils have made less than average progress. Not only should definite class standards be set but each pupil should know how his record compares with the standard for the class. How well a class reads may be measured by applying standard reading tests. Records on these tests should be kept prominently before the class. Subsequent progress may be determined by the use of tests of similar design.

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